mennen medical

ENVOY
ENSEMBLE -ENGUARD

SERVICE MANUAL

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November 2005

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Conformity according to the Council Directive 93/42/EEC

concerning Medical Devices

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Chapter 10: Technical Drawings

Chapter 1

General Description

This chapter includes the following sections:

- System overview
- Capabilities and features
- MPU front panel controls
- MPU rear panel connectors and switches
- System configuration setup (basic)
- Technical specifications

1.1 System Overview

The ***Envoy*** bedside monitor is a modular standalone bedside unit (see Figure 1-1) consisting of the following hardware components:

- Main Processing Unit (MPU)
- Mountable color display monitor
- Module Rack
- Various Mennen Medical plug-in modules

All clinical data collected from the input modules is stored in the MPU. This data includes waveforms, vital signs, trends, charts and beat-to-beat data.

The MPU sends the processed data in real-time to the display monitor or transmits it as an alarm signal to the unit's sound system. The MPU can store at least three days of patient data for review purposes.

Up to six internal and two external modules can be plugged into each module rack.

The vital sign data derived from the modules by the ***Envoy*** are presented on the monitor as waveform and numeric displays. The ***Envoy*** can display up to eight traces, depending on how the vital sign display is configured.

The ***Envoy***'s user interface is especially designed for user-friendly operation. The fixed buttons and unique QuicKnob control on the front panel of the main processing unit enables quick and direct access to system parameters and functions.

The MPU back panel contains connectors to connect the MPU to the following:

- Display monitor
- Module rack
- Local recorder, Central Station, laser printer or HUB.
- Remote keypad
- Mouse
- Keyboard

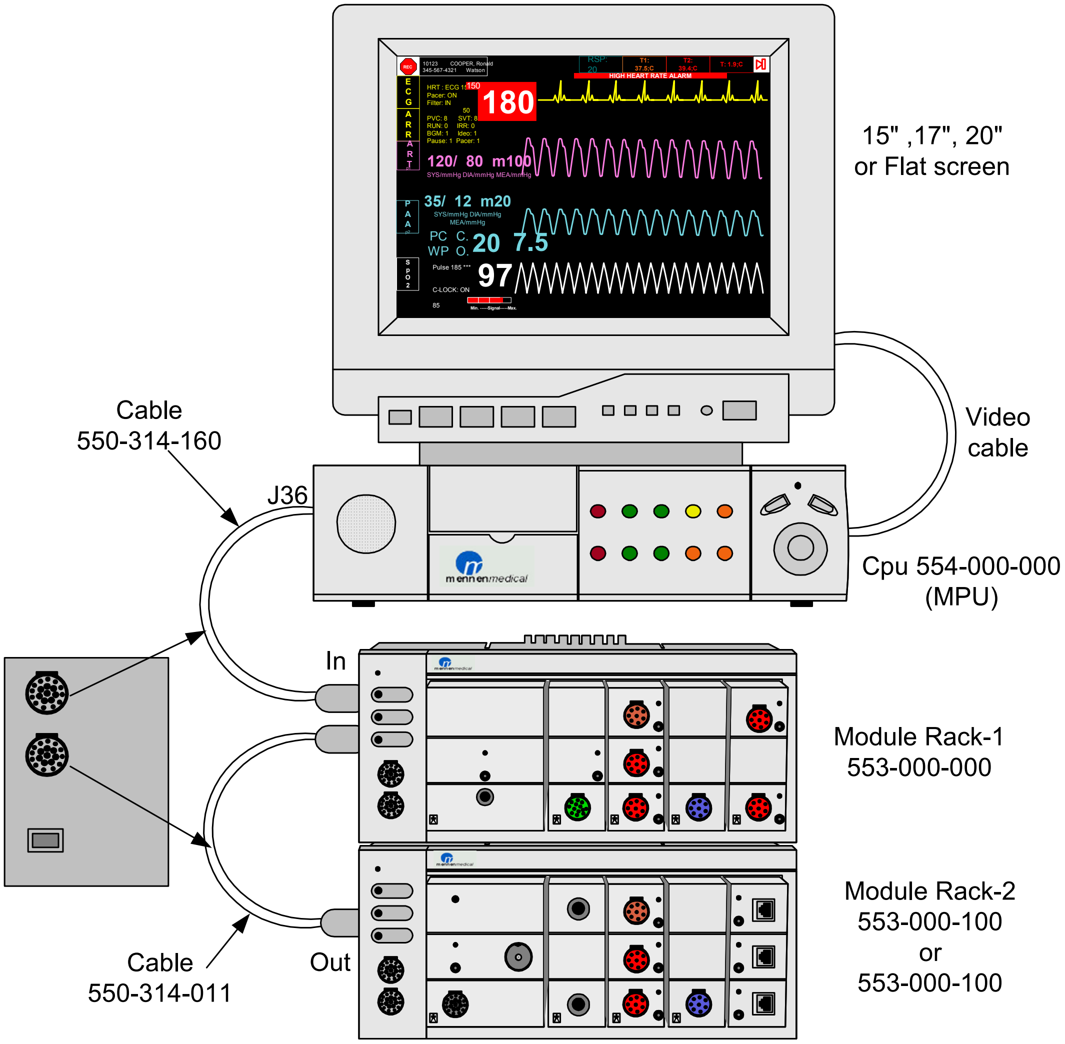

15" ,17", 20"
or Flat screen
Cable
550-314-160
J36
Video
cable
Cpu 554-000-000
(MPU)
In
Module Rack-1
553-000-000
Module Rack-2
553-000-100
or
553-000-100
Cable
550-314-011
Out

Figure 1-1. The Envoy Bedside Monitor

Only licensed, qualified technicians should provide service for the Envoy bedside monitoring system.

1.2 Capabilities and Features

The ***Envoy*** displays a wide range of vital sign clinical parameters derived from Mennen Medical modules. These modules include:

- ECG/Respiration multi-lead module for monitoring ECG and respiration.
- Dual BP & CO/2TMP module for monitoring two invasive blood pressures and either Thermodilution cardiac output or two temperatures.
- NIBP module for monitoring non-invasive blood pressure using the oscillometric method.
- Pulse Oximetry (SpO_2) module for monitoring SpO_2.
- End Tidal CO_2 ($EtCO_2$) module for monitoring CO_2 during exhalation ($EtCO_2$) and inhalation ($inCO_2$).
- The EEG module uses a five-electrode configuration to sense the spontaneous bio-electric potentials associated with the activity of the brain.
- The Spirometry module enables monitoring the flow, volume, airway pressure and lung mechanic parameters.

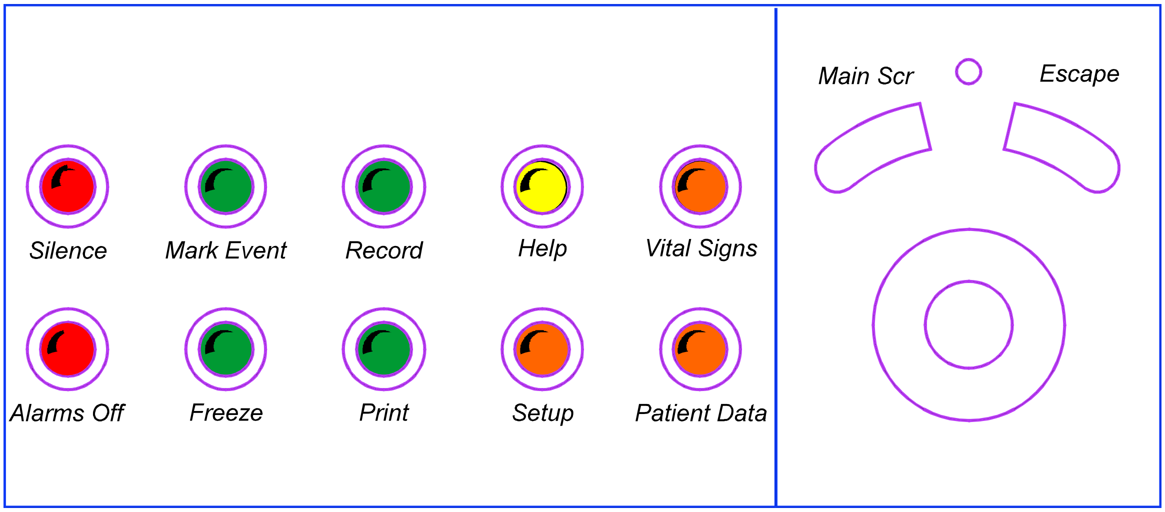
- The ***Envoy***'s main monitoring features include:
  - Continuously updated vital sign parameter data displayed as numeric values and continuous waveforms.
  - Flexible parameter configuration for each ***Envoy*** provided by the easily transferable plug-in modules.
  - Clinical and technical alarm detection as well as alarm notification in audio and visual formats.
  - Easy access to collected data in the form of tabular charts and graphical trends as well as various types of clinical reports.
  - Patient data output to a recorder or a printer, if connected.
- You can interact with the ***Envoy***:
  - Using interactive panels
    These panels include menus and dialog panels that enable you to configure system and monitoring parameters.

- Responding to Events
  Fixed keys on the front panel of the main processing unit enable you to respond quickly to events such as alarms.
- Reviewing Clinical Data
  Charts, Trends, Full Disclosure and Overview enable you to view and compare data in different formats and over selected time periods.

1.3 MPU Front Panel Controls

The front panel of the MPU has twelve fixed keys and a QuicKnob. The front panel enables the interaction with the ***Envoy***.

Note: ***Remote keypad including fixed keys and QuicKnob is available.***



Silence
Mark Event
Record
Help
Vital Signs
Alarms Off
Freeze
Print
Setup
Patient Data
Main Scr
Escape

Figure 1-2. Figure ***Error! No text of specified style in document.****-1Front Panel of the* ***Envoy***

Fixed Keys

The color of each fixed key is function-related. Red keys are alarm-related. Orange keys access a series of menus and panels, which enable you to configure and control vital sign, setup and data review functions. Green keys control certain display functions, such as record, freeze or mark event. The Help key is yellow and is currently not in use.

The following table describes the function keys:

Fixed Key	Color	Function
Silence	Red	Pressing the **Silence** key disables any active alarm tones for a pre-defined period of 60 seconds. The alarm condition still exists and visual indication of the alarm remains on screen. If a new alarm is triggered during the silence period, the Silence function is cancelled.
Alarms Off	Red	Pressing **Alarms Off** disables all alarm detection for a pre-set period of 60 seconds. The message All Alarms Off is displayed in the alarm message area. Press **Alarms Off** again to re-activate alarms. When connected with other systems, such as the Ensemble Central Station, the default time for **Alarms Off** is 2 minutes, regardless of the time duration configured at the bedside monitor. ***Note:*** *In countries where this option is not permitted by law,* ***Alarms Off*** *can be disabled in system configuration.*
Freeze	Green	Pressing **Freeze** stops on-screen updating of waveform information for a pre-set period of time. All other vital signs functions are still active. Press **Freeze** again to reactivate updating of waveforms. **Freeze** duration is set in System Configuration. Options available are 10, 20 and 30 seconds.
Mark Event	Green	The ***Envoy*** stores and continuously updates all patient data. Pressing **Mark Event** marks required data enabling the user to go back and pinpoint it later.
Record	Green	Activates the strip chart recorder, if available. The recorder connects to the LAN via cable 554-314-008.
Print	Green	Activates laser printer, if available. Press to **Print** Clinical Reports, Patient's Waveforms and screen

		captures.
Setup	Orange	Press **Setup** to access the Setup menu panel. This menu give you access to all admission, discharge and transfer functions and Display Controls. Setup functions are described in “Admission, Discharge and Transfer Procedures” in the ***Envoy*** Operating Manual.
Patient Data	Orange	Press **Patient Data** to display the Patient Data menu panel. This menu gives you access to Chart, Trends, Calculations, Selective Recording, Reports, Full Disclosure and Overview functions.
Vital Signs	Orange	Press the **Vital Signs** key to display the Vital Signs menu. This menu give you access to all panels relating to monitored vital signs. See the appropriate section for each vital sign in the ***Envoy*** Operating Manual.

Escape Key

When a panel or menu is open, pressing Escape allows you to:

- Exit an open list box without implementing any changes.
- Exit a panel without implementing any changes.

Note: ***This does not apply to panels in which changes are implemented immediately, such as Alarm Settings.***

Main Screen Key

Pressing the Main Screen key saves changes made on open panels, closes the panels and returns you to the main screen display.

QuicKnob

The QuicKnob permits you to interact with the display screen, menus and dialog panels. Turn the QuicKnob clockwise or counterclockwise to move through all areas of the main screen display, menus and dialog panels. As you pass through an area, it is highlighted. When you search a required area, press the QuicKnob to select it.

Note: ***The QuicKnob is also used to set values on a scale such as when setting alarm limits using the slider bar in the Alarms panel. In this case, turning the knob clockwise or counterclockwise increases or decreases the value by units of five or ten. Turning the knob clockwise or counterclockwise while pressing results in an increase or decrease in single units.***

For more information about operating the ***Envoy***, see “*Envoy Patient Monitor Operating Manual*”.

1.4 MPU Rear Panel Connectors

The MPU rear panel includes the following connectors and switches:

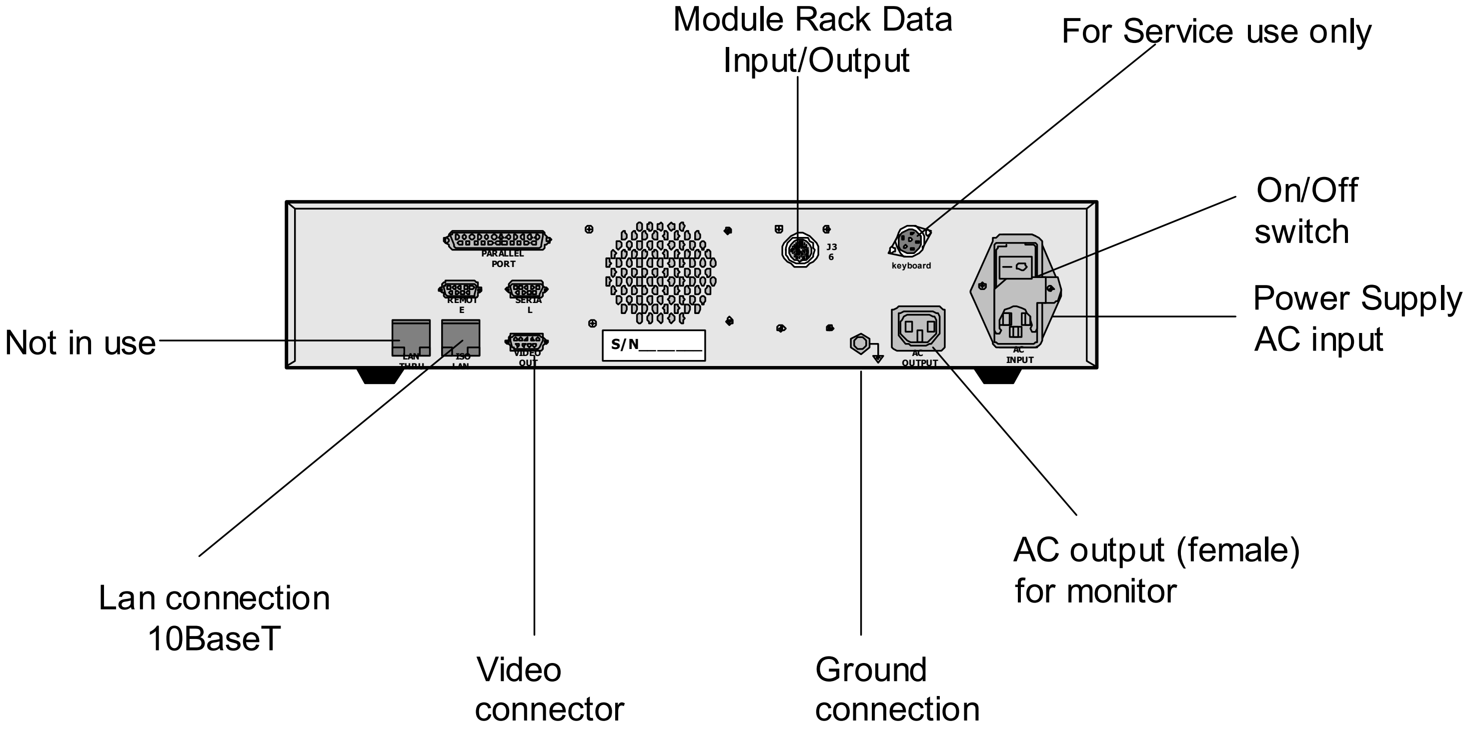
On/Off Switch (Fuse x 2)	Power switch and fuse assembly. Plug assembly must be disconnected to access fuses.
A/C Output (Female)	Three-wire AC line output for connection to display monitor. Power to this connection comes directly from the main power input.
AC Input (Male)	Three-wire AC input for connection to hospital-grade power supply outlet.
Module Rack Data Input (J36)	The data input from the module rack to the MPU.
GND	Provides equipotential grounding. The module data cable includes a grounding shield that automatically provides grounding protection between the module rack and the MPU.
⚠	*You must ground the **Envoy** system to protect the patient and hospital personnel. The system is equipped with a detachable 3-wire cable which grounds the instrument to the power line ground (protective earth) when plugged into an appropriate 3–wire receptacle. Do not use a 3-prong to 2-prong non-earthen plug adapter.*
Video Out	VGA output to the display monitor.
Parallel Port	Not currently in use.
Remote keypad	Connector for remote control keypad.
Com 1	Serial communication interface (RS-232).
Ext. keyboard	Connector for keyboard
PS/2 to mouse	Connector for mouse – new MPU
ISO LAN	Isolated LAN (5000V), main LAN interface (RJ-45).
LAN THRU	LAN Connection (RJ-45) to LAN hub via twisted pair cable.
Local	LAN connection (RJ-45) to local recorder

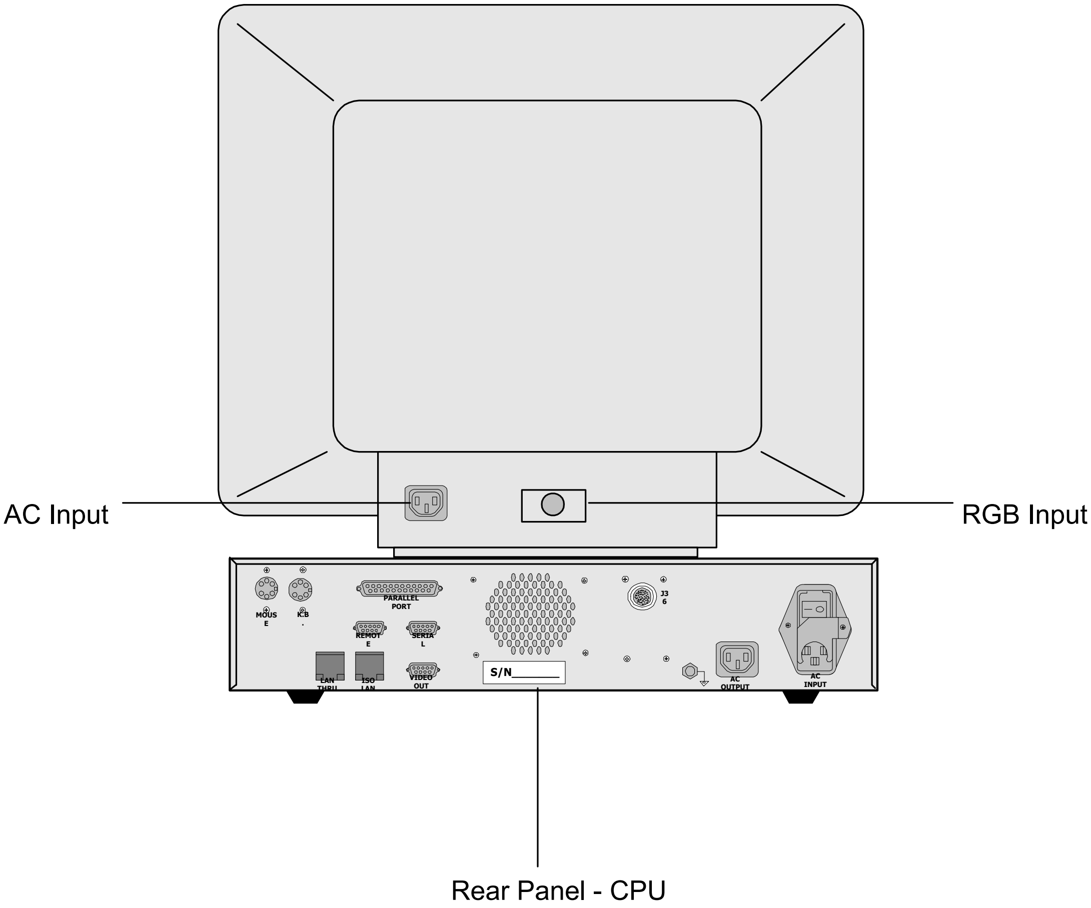
Recorder (bridged directly to LAN THRU connector).

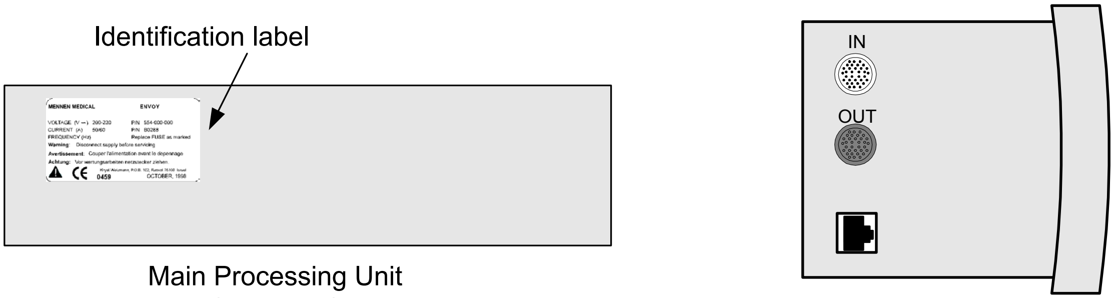
See the notes on pages 1-9; 1-10 and 1-11.

Figure 1-3A. Rear Panel of the older model of the MPU of the Envoy

Note: For chassis with serial numbers below 350


Module Rack Data Input/Output
For Service use only
On/Off switch
Power Supply AC input
Not in use
PARALLEL PORT
REMOT E
SERIA L
LAN THRU
ISO LAN
VIDEO OUT
S/N______
J3 6
keyboard
AC OUTPUT
AC INPUT
Lan connection 10BaseT
Video connector
Ground connection
AC output (female) for monitor


AC Input
RGB Input
MOUSE
KB
PARALLEL PORT
REMOTE
SERIAL
LAN THRU
ISO LAN
VIDEO OUT
S/N
J36
AC OUTPUT
AC INPUT
Rear Panel - CPU


Identification label
MENNEN MEDICAL ENVOY
VOLTAGE (V ⎓) 200-230 P/N 554-600-000
CURRENT (A) 50/60 P/N 80288
FREQUENCY (Hz) Replace FUSE as marked
Warning: Disconnect supply before servicing
Avertissement: Couper l'alimentation avant le depennage
Achtung: Vor wartungsarbeiten netzstecker ziehen.
Kiryat Weizmann, P.O.B. 102, Rehovot 76100 Israel
CE 0459 OCTOBER, 1998
IN
OUT

Main Processing Unit
(side view)

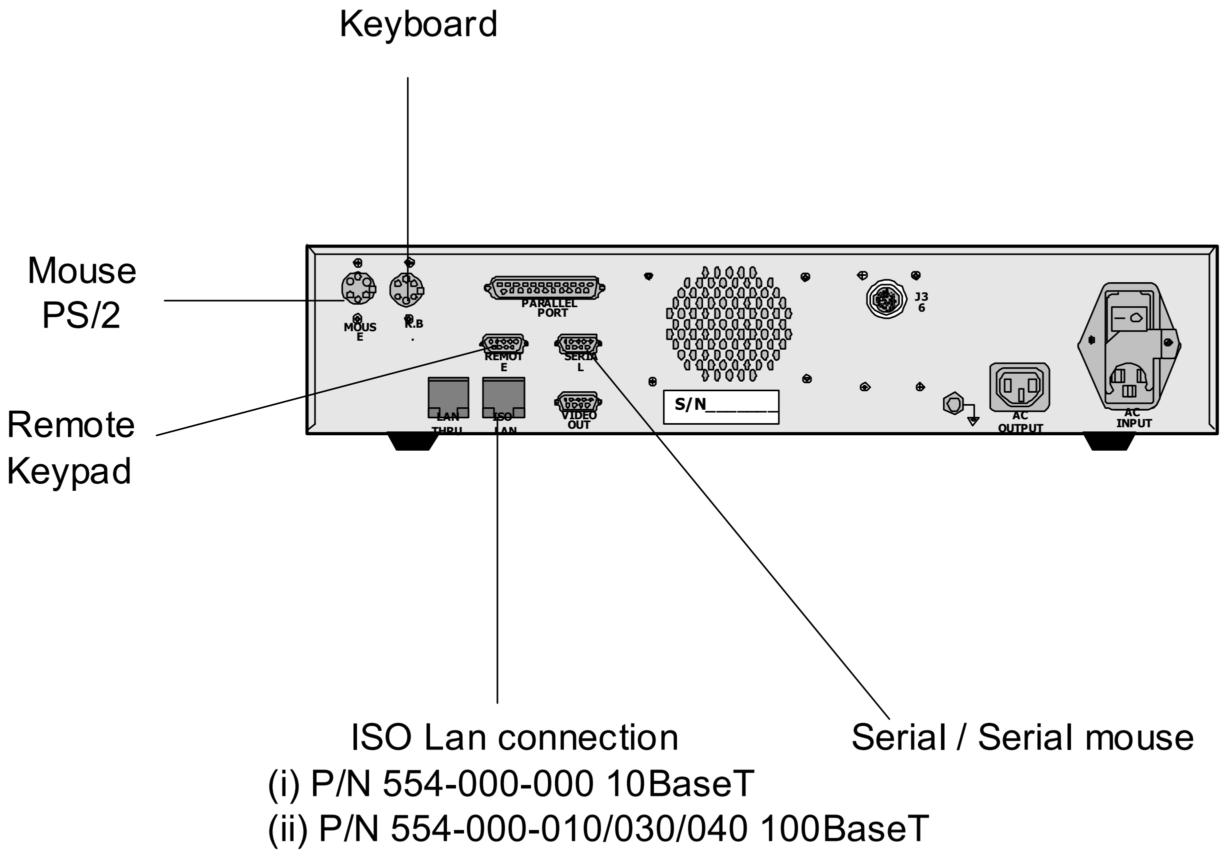
Module Rack
(side view)

Figure 1-3B. Rear Panel of the Envoy

Note: For chassis with serial numbers above 350

Figure 1-3C. Rear Panel of the new model of the MPU of the Envoy

Note: For chassis with serial numbers above 350


Keyboard
Mouse PS/2
Remote Keypad
MOUS E
K.B .
PARALLEL PORT
REMOT E
SERIA L
LAN THRU
ISO LAN
VIDEO OUT
S/N______
J3 6
AC OUTPUT
AC INPUT
ISO Lan connection
(i) P/N 554-000-000 10BaseT
(ii) P/N 554-000-010/030/040 100BaseT
Serial / Serial mouse

1.5 System Configuration Setup (Basic)

The system configuration setup consists of a Central Nurse Station (“Ensemble”) connected through an Ethernet-LAN hub to the ***Envoy*** bedside monitors, local recorder and central recorder. The ***Envoy*** bedside monitors and recorders are hard-wired and remain stationary.

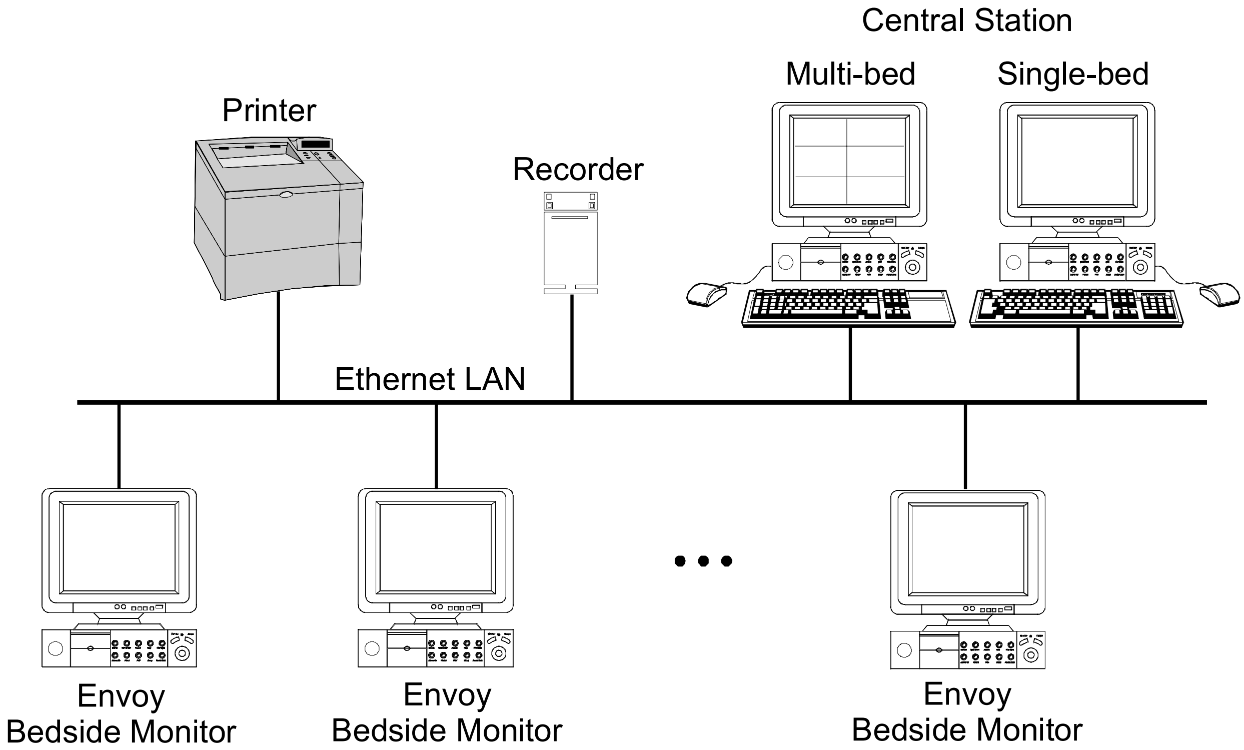

Central Station
Multi-bed
Single-bed
Printer
Recorder
Ethernet LAN
Envoy Bedside Monitor
Envoy Bedside Monitor
• • •
Envoy Bedside Monitor

Figure 1-4. System Basic Setup (with recorder)

1.6 System Specifications

General	Component-style monitor with Modular Front End CPU with user controls 15”, 17”,LCD Module Rack and Modules Class I Equipment (Enclosure Grounded) Ordinary equipment continuous operation Applied Part Type BF for: NIBP, SpO2, EtCO2, Spirometry Defibrillation-proof Applied Part Type CF for: ECG, EEG, BP, CO/2 Temp Defibrillation-proof
CPU Details	Intel X86 family main CPU Pentium Celeron 733 MHz (subject to change/upgrade) Sound Blaster compatible, 4W audio power 128 MB RAM (subject to change/upgrade) Mass storage: 40GB fixed disk (subject to change/upgrade) Operating system: QNX Window manager: Photon
User Controls	Fixed Keys QuicKnobTM
CPU Dimensions (not including CRT)	Height: 9.0 cm/3.625 in Width: 33.0 cm/13.0 in Depth: 37.0 cm/14.5 in Weight: 8 kg/17.6 lb
Power Requirements (not including CRT)	120 VAC, 2 A, 60 Hz (factory set) Fuse rating 3.15 A 230 VAC, 1 A, 50 Hz (factory set) Fuse rating 2.0 A

Network	Physical: IEEE 802.3 Ethernet interface with Category 5, 10 or 100BaseT twisted pair media. Other media available. Protocol: TCP/IP
Color Display	Size: 15”, 17” (and 20” optional); Flat TFT display Length: 46 cm (18.1”) Width: 42 cm (16.5”) Height: 45 cm (17.7”) Traces: 1 to 8, depending on parameter-specific setup choices Resolution: 1024 x 768
Recorder Unit	Length: 20 cm (7.8”) Width: 8 cm (3.1”) Height: 16 cm (6.2”)
Module Racks (#1 and #2)	Length: 30 cm (11.8”) Width: 13 cm (5.1”) Height: 15 cm (5.9”)
Vital Signs Modules	Single Module: Height: 10.0 cm (4.0 in) Width: 4.0 cm (1.6 in) Depth: 14.0 cm (5.5 in) Double Module: Height: 10.0 cm (4.0 in) Width: 8.0 cm (3.2 in) Depth: 14.0 cm (5.5 in)
Multi Lead (3/5/6 Lead) ***ECG/RSP Module***	Multi-lead ECG module Includes respiration monitoring and O.R. filter LED for function indication

ECG (3/5/6 Lead)

Sampling Rate and Resolution

640Hz sampling rate
22 bit resolution

Frequency Response

0.05 to 150 Hz
0.5 to 40 Hz
1.0 to 25 Hz

QRS Detection Range

0.25 to 5.0 millivolt height
70 to 120 milliseconds width
Heart Rate Counting
20 to 300 BPM
Accuracy: ± 2 BPM
Note: Values below 20 are forced to zero.
Heart Rate Alarm Settings
High and low rate: 20 - 250 BPM non-overlapping
Leads analyzed for:
Heart Rate and Arrhythmia Configuration
Top two displayed

Fixed:

I, II, III, aVR, aVL, aVF, V (5 Lead cable)
I, II, III, aVR, aVL, aVF, Va, Vb (6 Lead cable);
V1-V6 (12 Lead module)

Common Mode Rejection

120 dB, minimum

Lead Fault Detection: based on impedance
Pacemaker Detection and Rejection

Amplitude: 2 mV to 700 mV

Width: 0.1 ms to 2.0 ms

Pacemaker flag inserted into displayed waveform

Data Storage (in mainframe):

- Beat notification
- RR Interval
- Heart Rate
- ST values
- Arrhythmia
- Alarms

Patient identification
Parameter settings
Cycle time and measurement time markers
All measurements for 36 hrs
S/D/M and pulse rate values
Alarm event markers

Respiration	Lead Selection RA-LA or RA-LL Respiration Sensitivity Range 0.2 ohm to 5.0 ohm Impedance Range 100 to 3,000 ohm @ 65 kHz Respiration Rate Counting Range 8 to 150 BPM Respiration Frequency Response 0.13 to 2.5 Hz (-3 dB) Sampling rate: 38 Hz Respiration Alarm Settings Low rate: 0 - 150 BPM High rate: 8 - 150 BPM Apnea: User configurable Cardiac coincidence alarm Data Storage (in mainframe): o Respiration rate o Respiration rate Alarms o Apnea alarms Patient identification Waveform labels and annotations Instantaneous resp. rate Alarm event markers
12 Lead ECG/RESP	3/5/6/12 Leads ECG Includes respiration monitoring LED for function indication

ECG (12 Lead ECG/Resp)	Sampling Rate and Resolution 640 Hz sampling rate 22 bit resolution Frequency Response Diagnostic: 0.05 to 150 Hz Monitor: 0.5 to 40 Hz Exercise: 1.0 to 25 Hz ST Analysis: 0.05 to 40 Hz QRS Detection Range 0.25 to 5.0 millivolt height 70 to 120 milliseconds width Heart Rate counting 20 to 300 BPM Accuracy ± 2 BPM *Note: Values below 20 are forced to zero.*
	Heart Rate Alarm Settings High and low rate: 20-250 BPM, non-overlapping
	Leads analyzed for: o Top two displayed o Heart rate and arrhythmia
	Common Mode Rejection 120dB, minimum Lead fault detection based on impedance
	Pacemaker Detection and Rejection Amplitude: 2mV to 700 mV Width: 0.1 ms to 2.0 ms Pacemaker flag inserted into displayed waveform
	ST Segment All available leads

Respiration

Lead Selection
- **RA-LA or RA-LL**

Respiration Sensitivity Range:
- 0.2 ohm to 5.0 ohm

Impedance range
  100 to 3000 ohm @ 65 kHz

Respiration Rate Counting Range:
- 8 to 150 BPM

Sampling rate and Resolution
  Sampling Rate: 640 Hz
  Resolution: 22 bit

Respiration Frequency Response
- 0.13 to 2.5 Hz

Respiration Alarm Settings
- Low rate: 0-120 BPM
- High rate: 8-120 BPM
- Apnea: User configurable duration and reset.
- 10 to 900 sec. HR alarm

Respiration Data Storage (in mainframe):
  Patient identification
  Waveform labels and annotations
  Instantaneous respiration rate

Alarm event markers

Dual BP and CO/2TMP Modules

Single module size

2 invasive blood pressures

Thermodilution Cardiac Output, or 2 temperatures

LED for function indication

Blood Pressure

Site Labels:

- BPX, ART, PAP, CVP, RAP, LAP, ICP

Input Sensitivity

- 5 microVolt/Volt/mmHg

Dynamic Range

- Pressure range: -50 to +300 mmHg
- Zero range: ±150 mmHg
- Total dynamic range: -200 to +450 mmHg

Transducer Excitation Voltage

- +5 VDC
- Separate excitation driver for each channel

Zero Accuracy

- ±0.2 mmHg

Zero Drift

- Less than ±0.2 mmHg in 24 hours, at constant temperature)

Blood Pressure Accuracy

- ±2 mmHg or ±2%, whichever is greater, exclusive of transducer

Blood Pressure Linearity

- within 1% across entire range

Waveform Frequency Response

- 0 - 15 Hz

Sampling Rate

- 320 Hz

Fault Detection

- Shorted transducer
- Transducer in/out
- Cable out

Data Storage (in mainframe):

- Systolic, Diastolic and Mean
- Alarms

Cardiac Output and Temperature

Adapter and Compatibility Cables

- COSet[a] Interface cable
- Ice Bath Cardiac Output interface cable
- Dual temperature interface cable (ysi-400)

Temperature Range

- Blood temperature: 27°C to 45°C (80.6° to 113° F)
- Injectate temperature: 0°C to 25°C (32° to 77° F)
- Body temperature: 0°C to 43°C (32° to 109.4°F)

Accuracy

- Blood temperature: ±0.1°C (32.18°F)
- Injectate temperature: ±0.1°C (32.18°F)

Excitation

- 10µA, maximum

Frequency Response

- 0 to 15 Hz

Cardiac Output Determination Range

- 0 to 20 liters per minute

Injectate Volumes

- 1, 3, 5, and 10cc

Computation Constants

- Table built as new values are used

Displayed Data

- Cardiac Output, Cardiac Index, Stroke Volume, Stroke Volume Index, Blood Temperature, Injectate Temperature, Trial Number

Data Storage (in mainframe):

- In Cardiac Output mode
    - Cardiac Output
    - Hemodynamic Calculation results
    - Measuring time
- In Two Temp mode:
    - Temperatures and Delta-Temp
    - Temperature Alarms

Non-Invasive Blood Pressure Module

Double module size

LED for function indication

Oscillometric Method

Displayed Parameters

- Systolic, Diastolic, Mean pressure values
- Time of last measurement, measurement interval, cuff size, and heart rate
- Inflation Rate
- Within 5 sec.
- Cycle Times

Deflation time (typical): 30 sec.

BP time-out: 60 - 180 sec.

Measurement Ranges (in mmHg)

- Systolic: 25 to 255
- Diastolic: 10 to 220
- Mean: 18 to 235

Measurement Ranges (in mmHg) Neonatal

- Systolic: 20 to 135
- Diastolic: 5 to 110
- Mean: 10-125

Modes: Adult, Auto, Manual, STAT, Self Test

Pressure (Transducer) Accuracy

- ±3 mmHg or ±2%, whichever is greater

Heart Rate

- 40 to 140 BPM

Data Storage (in mainframe):

- Patient identification
- Parameter settings
- Measurement modes
- Beat labels and annotations
- Cycle time and measurement time markers
- S/D/M and HR values
- Alarm even markers

Pulse Oximetry (Sp0$_2$) Module

Single module size (Nellcor Technology - MP204P)

Saturation Range

- 1% to 100% Sp0$_2$

Sp02 Accuracy

- % SpO$_2$ ± 1 standard deviation

Pulse Rate Range

- 20 to 250 BPM ±3 BPM

Saturation alarm limits: 50% to 100%

Data Storage (in mainframe):

- Heart rate and O2 saturation
- Alarms

End Tidal CO$_2$ DUET (EtCO$_2$) Duet Module

Double module size

LED for function indication

Air outlet for sidestream monitoring

Displayed Data

- Waveform labels and annotations
- EtCO2, inCO2 and respiration rate values

EtCO$_2$ Alarm Limits: 0 to 100 mmHg/0 to 10%/0-15 kPA

inCO$_2$ Alarm Limits: 0 to 100 mmHg/0 to 10%/0-15 kPA

Respiration Rate Alarm Limits:

- Neonatal: 0 to 150 BMP
- Adult: 0 to 50 BPM

Data Storage (in mainframe):

- Patient identification
- Waveform labels and annotations
- EtCO2, inCO2 and respiration rate values
- Alarm event markers

End Tidal CO2 Microstream (EtCO2) Module

Single module size

LED for function indication

Air outlet for sidestream monitoring

Displayed Data

- Waveform labels and annotations
- EtCO2, inCO2 and respiration rate values

CO2 Display Range: 0-100 mmHg

Measurement Resolution:

Typical Accuracy:

- ±2 mmHg for CO2 range of 0-38 mmHg
- ±5% for CO2 range of 39-99 mmHg + 0.08%for every 1 mmHg above 38 mmHg

- Respiration Rate 0 – 70 bpm +/- 1 bpm
71 – 120 bpm +/- 2 bpm
121 – 150 bpm +/- 3 bpm

Rise Time 190 msec (10% - 90%)

Delay Time 2.7 Sec (10% - 90%) typical.

CO2 Alarm Limits: 0 to 100 mmHg/0 - 10%/0-15 kPA

Accuracy:

- for % measurement: 0.1%
- for mmHg measurement: 1mm

Respiration Rate Alarm Limits:

- Neonatal: 0 to 150 BMP
- Adult: 0-50 BPM

Sidestream Flow Rate: 50 ml/min. nominal

Start-up Time:

- 30 sec. typical

Automatic Compensation: At least once per hour

Ambient Temperature:

- 0-65° C Sidestream
- 10-40° C Mainstream

Humidity: 10-95% RH, non-condensing

Barometric Pressure: 430-795 Hg (-1250 to 15,000 ft.)

Data Storage (in mainframe):

- EtCO2, inCO2 and Respiration Rate values
- Alarms
- Apnea Alarm

Clinical Software Features	Waveform Display – 175mm horizontal area – 7 sec. @ 25mm/sec – Up to 8 traces – Overlapping traces – Expanded display
Numeric Display	85mm horizontal area 25mm Heart Rate 20mm Sp02 “Big Numbers”
Default Alarms	User defined Fixed or calculated values
Data Display	Tabular charts Graphic trends
Uniport (UIM) Module	Single module size Single channel/port Interface codes for up to 31 external devices Cable In/Out Detection Provides electrical isolation between Envoy and external device/s Displays clinical and technical alarms from external device/s
Multiport (UIM) Module	Single module size Three channels/ports Interface codes for up to 31 external devices Cable In/Out Detection Provides electrical isolation between Envoy and external device/s Displays clinical and technical alarms from external device/s

Electrical Specifications

Main Processing Unit

AC Power Input

- 90-132/180-264 VAC, single phase, at 47-63 Hz.
- Maximum current:
    - Dual fuse: each 3.15A, 250V. Slow Blow.

AC Power Output for Local Display

- 90-132/180-264 VAC at 47-63 Hz, single phase. Comes through the MPU power switch.
  Maximum Output power: 130W

Display Monitor

- 15”, 17”, 20” and flat screen (15”, 18”) are available.
- Complies with Part 15 of the FCC Rules.

Module Rack No. 1

- DC power input:
    - 12V +5%/-10% DC input from the Main Processing Unit power supply.
- Control and data signals:
    - From the PC/104 Comm card within the MPU, together with its power supply wires, are fed through J36 connector into IN connector of the module rack.

Module Rack No. 2 (Optional)

- DC power input:
    - 12V +5%/-10% DC input from OUT connector of module rack No. 1.
- Control and data signals:
    - From Module Rack No.1 OUT connector that carries power and control signals to OUT connector of module rack No. 2.

Environmental Specifications

Operating Conditions	Temperature:	+5ºC to +40ºC
	Humidity:	10 to 95 percent, non-condensing
	Altitude:	-350 to 3050 meters (-1300 to 10,000 feet)
	Vibration/Shock:	per Mennen Medical: Design for Regulatory
Storage Conditions	Temperature:	-15 ºC to +60 ºC
	Humidity:	10 to 95 percent, non-condensing
	Altitude:	-350 to 5000 meters (-1300 to 17,000 feet)

Chapter 2

System Module Description

Chapter 2 includes the following sections:

- MPU Functional Description
- MCU and RS-232 Splitter
- Module Rack Functional Description
- Display Monitor
- Remote Keypad and QuicKnob Functional Description
- P&SB Module Functional Description
- ECG/RSP Module Functional Description
- 12 Lead ECG/Resp. Module Functional Description
- 2BP & CO/2TMP Module Functional Description
- NIBP Module Functional Description
- NIBP Module (551-132-000-Single Slot)
- SPO_2 Module (Nellcor): Functional Description
- SpO2 Module (Masimo): Functional Description
- Dual EtCO2 Module Functional Description
- Mainstream EtCO2 Module Functional Description
- MicroStream EtCO2 Module
- Uniport Module Functional Description
- Multiport Module Functional Description
- Four Channel EEG Module (551-138-000)
- Spirometry Module (551-137-000)
- Patient Preparation Checklist

2.1 MPU Functional Description

The main processor unit (MPU) consists of the following hardware components - see *Figures 2-1A, B and C*:

- CPU card
- Main storage (hard disk)
- Main power supply
- MCU and RS-232 splitter
- BIOS setup flash memory
- Local keypad and QuicKnob
- Sound card and Speaker
- PCCOM board
- Video/ISO LAN board
- Front and rear panel

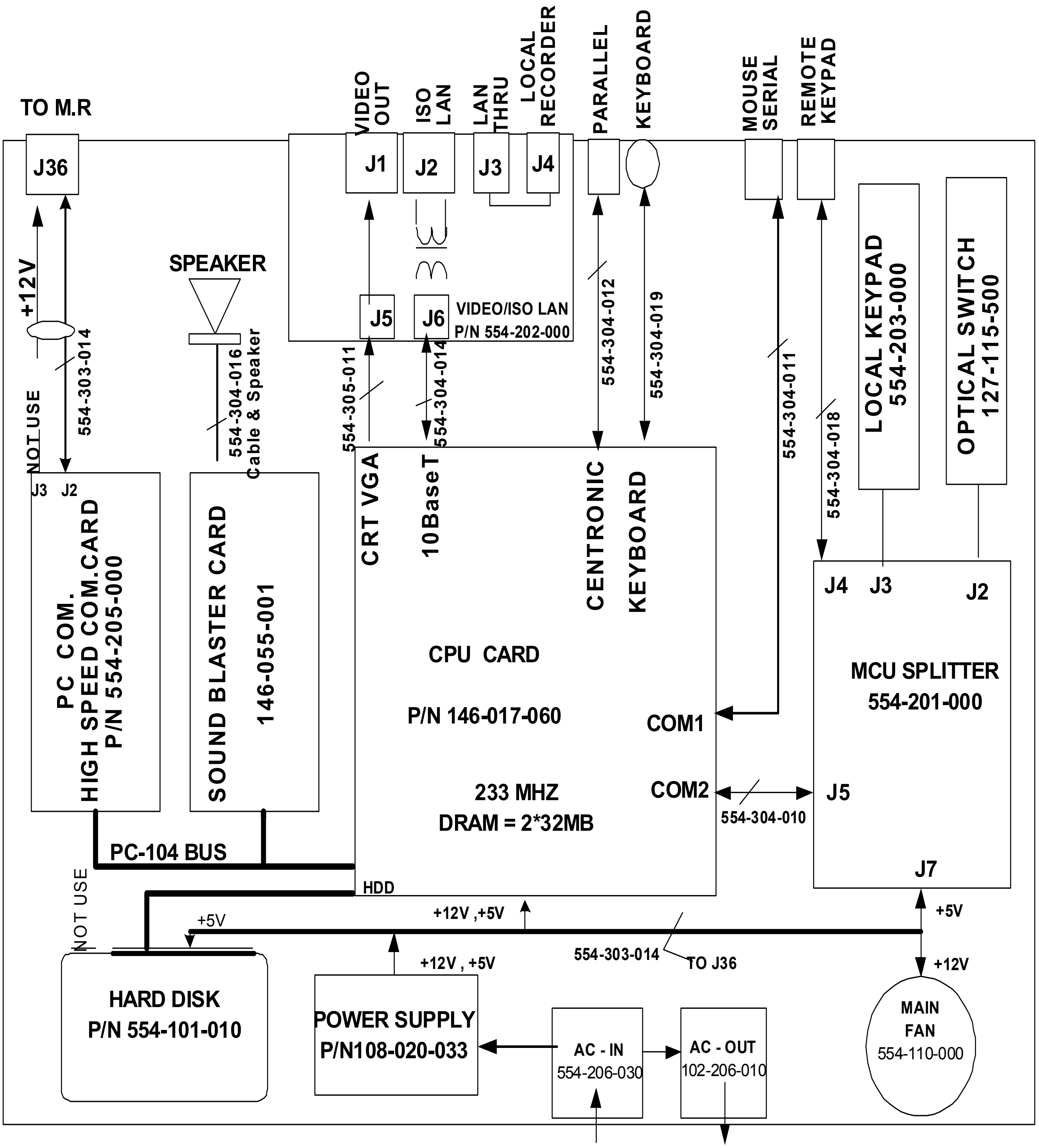

TO M.R
J36
+12V
NOT USE
554-303-014
SPEAKER
554-304-016
Cable & Speaker
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
J1
J2
J3
J4
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
554-305-011
554-304-014
PARALLEL
KEYBOARD
554-304-012
554-304-019
MOUSE SERIAL
REMOTE KEYPAD
554-304-011
554-304-018
LOCAL KEYPAD
554-203-000
OPTICAL SWITCH
127-115-500
J3 J2
PC COM.
HIGH SPEED COM.CARD
P/N 554-205-000
SOUND BLASTER CARD
146-055-001
CRT VGA
10BaseT
CENTRONIC
KEYBOARD
CPU CARD
P/N 146-017-060
233 MHZ
DRAM = 2*32MB
COM1
COM2
554-304-010
J4 J3
J2
MCU SPLITTER
554-201-000
J5
J7
PC-104 BUS
HDD
NOT USE
+5V
+12V ,+5V
554-303-014
TO J36
+5V
+12V
+12V , +5V
HARD DISK
P/N 554-101-010
POWER SUPPLY
P/N108-020-033
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN
FAN
554-110-000

Figure 2-1A. Main Processor Unit (MPU) – Block Diagram – 10BaseT (P/N 554-000-000)

Notes: 2X32 MB of memory is required for SW V2.4K and below
2X64 MB of memory is required for SW V3.0 and above*

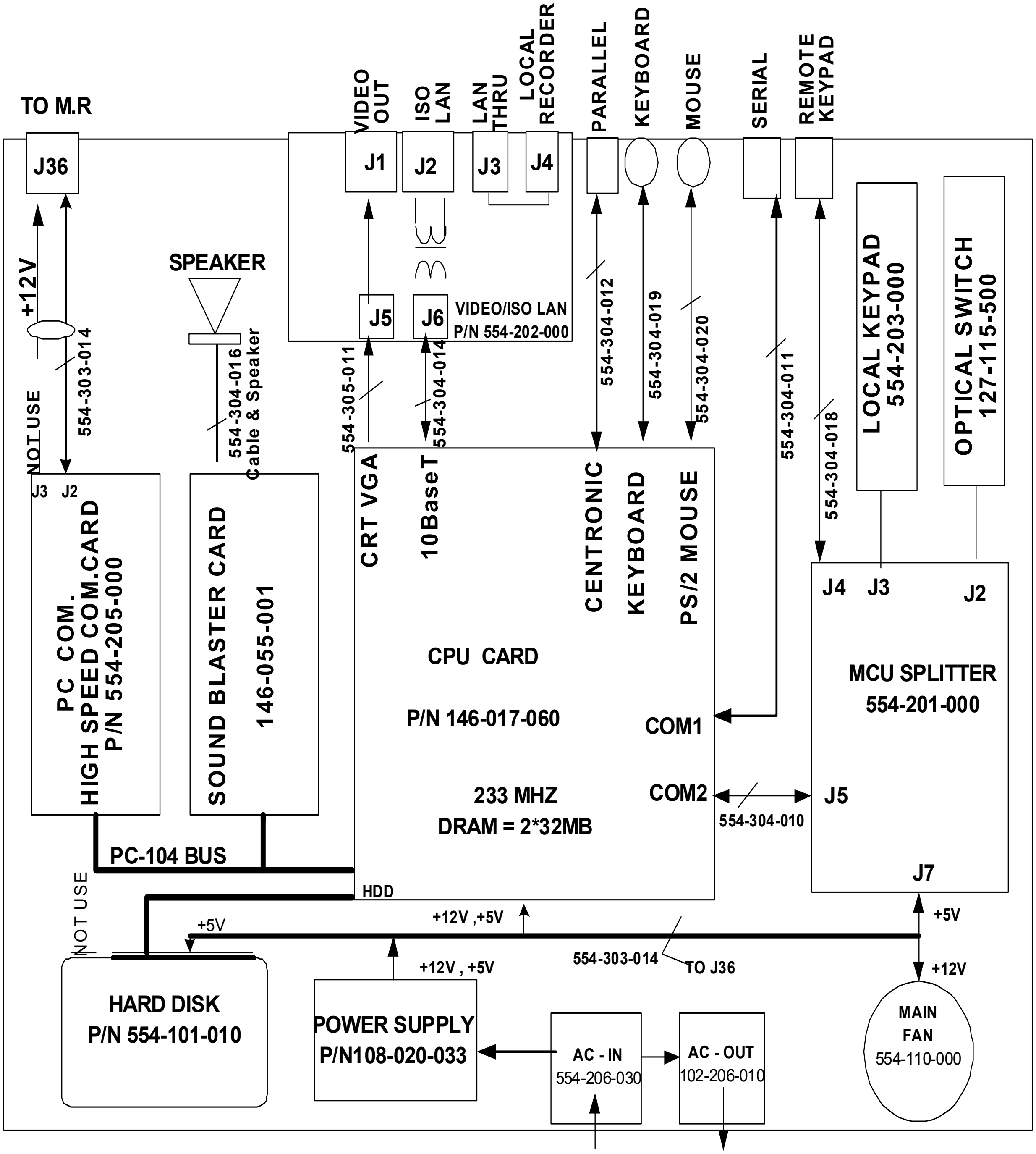

TO M.R
J36
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
PARALLEL
KEYBOARD
MOUSE
SERIAL
REMOTE KEYPAD
J1
J2
J3
J4
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
+12V
554-303-014
NOT USE
SPEAKER
554-304-016
Cable & Speaker
554-305-011
554-304-014
554-304-012
554-304-019
554-304-020
554-304-011
554-304-018
LOCAL KEYPAD
554-203-000
OPTICAL SWITCH
127-115-500
J3 J2
PC COM.
HIGH SPEED COM.CARD
P/N 554-205-000
SOUND BLASTER CARD
146-055-001
CRT VGA
10BaseT
CENTRONIC
KEYBOARD
PS/2 MOUSE
CPU CARD
P/N 146-017-060
233 MHZ
DRAM = 2*32MB
COM1
COM2
554-304-010
J4 J3 J2
MCU SPLITTER
554-201-000
J5
J7
PC-104 BUS
HDD
NOT USE
+5V
+12V ,+5V
+12V , +5V
554-303-014
TO J36
+5V
+12V
HARD DISK
P/N 554-101-010
POWER SUPPLY
P/N108-020-033
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN
FAN
554-110-000

Figure 2-1B. Main Processor Unit (MPU) – Block Diagram – 10BaseT ; PS/2 Mouse (P/N 554-000-000)

Notes: *2X32 MB of memory is required for SW V2.4K and below*
2X64 MB of memory is required for SW V3.0 and above*

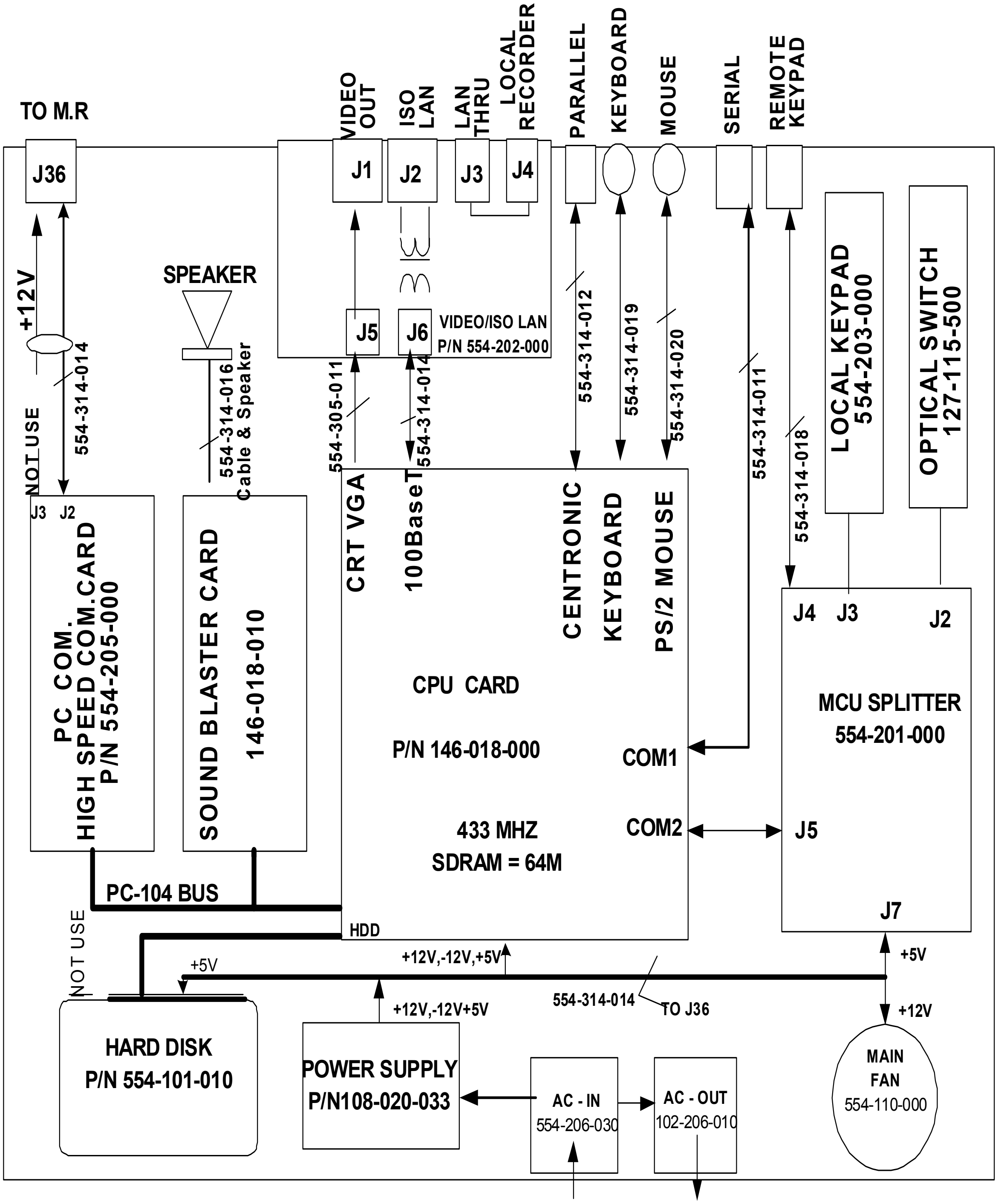

TO M.R
J36
+12V
NOT USE
554-314-014
J3 J2
PC COM.
HIGH SPEED COM.CARD
P/N 554-205-000
SPEAKER
554-314-016
Cable & Speaker
SOUND BLASTER CARD
146-018-010
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
J1
J2
J3
J4
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
554-305-011
554-314-014
CRT VGA
100BaseT
PARALLEL
KEYBOARD
MOUSE
SERIAL
REMOTE KEYPAD
554-314-012
554-314-019
554-314-020
554-314-011
554-314-018
CENTRONIC
KEYBOARD
PS/2 MOUSE
CPU CARD
P/N 146-018-000
433 MHZ
SDRAM = 64M
COM1
COM2
HDD
LOCAL KEYPAD
554-203-000
OPTICAL SWITCH
127-115-500
J4 J3
J2
MCU SPLITTER
554-201-000
J5
J7
PC-104 BUS
NOT USE
+5V
+12V,-12V,+5V
554-314-014
TO J36
+5V
+12V
HARD DISK
P/N 554-101-010
+12V,-12V+5V
POWER SUPPLY
P/N108-020-033
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN
FAN
554-110-000

Figure 2-1C. Main Processor Unit (MPU) – Block Diagram – 100BaseT (P/N 554-000-010)

Note: 128 MB of memory is required for SW V. 3.1 and above

Note: See page 2-96 for Block Diagram of Ensemble MPU –100BaseT (P/N 555-000-080)

MPU - BLOCK DIAGRAM, 554-000-030_100BaseT

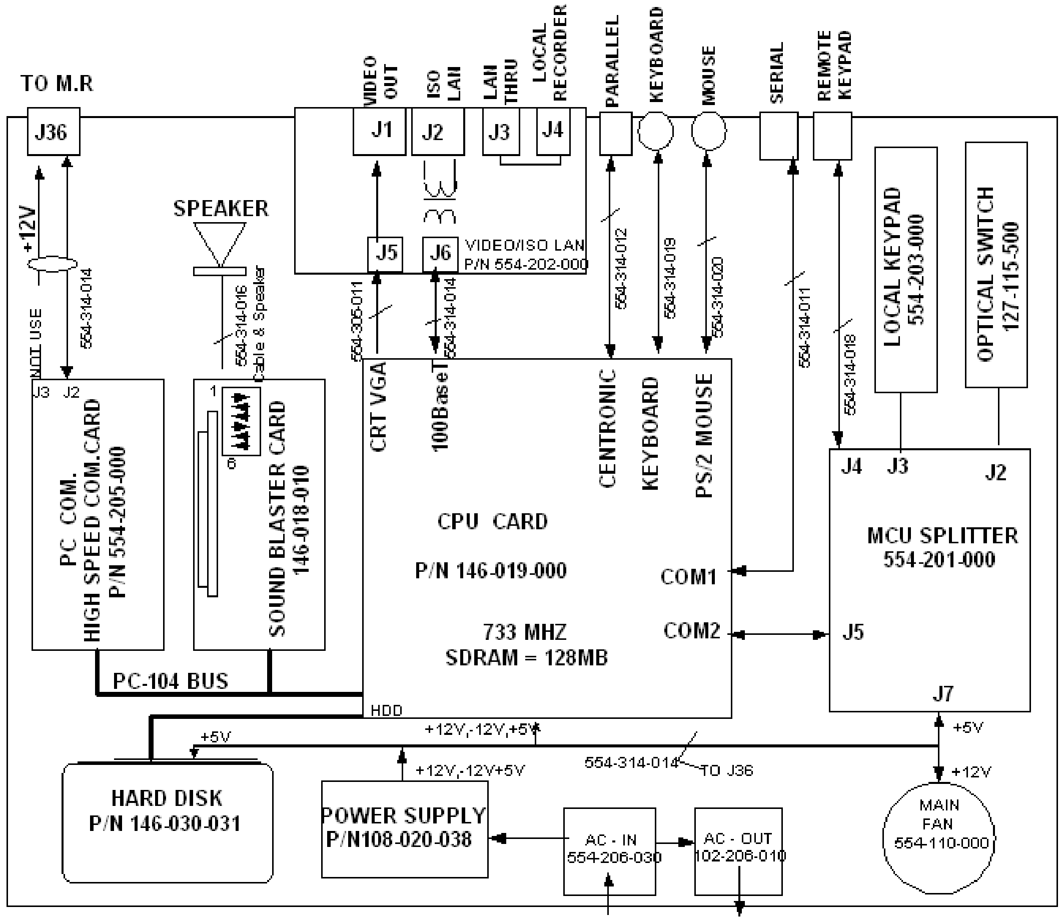

TO M.R
J36
+12V
NOT USE
554-314-014
SPEAKER
554-314-016 Cable & Speaker
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
J1
J2
J3
J4
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
554-305-011
554-314-014
PARALLEL
KEYBOARD
MOUSE
SERIAL
REMOTE KEYPAD
554-314-012
554-314-019
554-314-020
554-314-011
554-314-018
LOCAL KEYPAD
554-203-000
OPTICAL SWITCH
127-115-500
J3 J2
PC COM.
HIGH SPEED COM.CARD
P/N 554-205-000
1
6
SOUND BLASTER CARD
146-018-010
CRT VGA
100BaseT
CENTRONIC
KEYBOARD
PS/2 MOUSE
CPU CARD
P/N 146-019-000
COM1
733 MHZ
SDRAM = 128MB
COM2
J4 J3 J2
MCU SPLITTER
554-201-000
J5
J7
PC-104 BUS
HDD
+5V
+12V,-12V,+5V
+5V
+12V,-12V+5V
554-314-014
TO J36
+12V
HARD DISK
P/N 146-030-031
POWER SUPPLY
P/N108-020-038
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN
FAN
554-110-000

Figure 2-1D: Main Processor Unit (MPU) 554-000-030 100Base – Block Diagram.

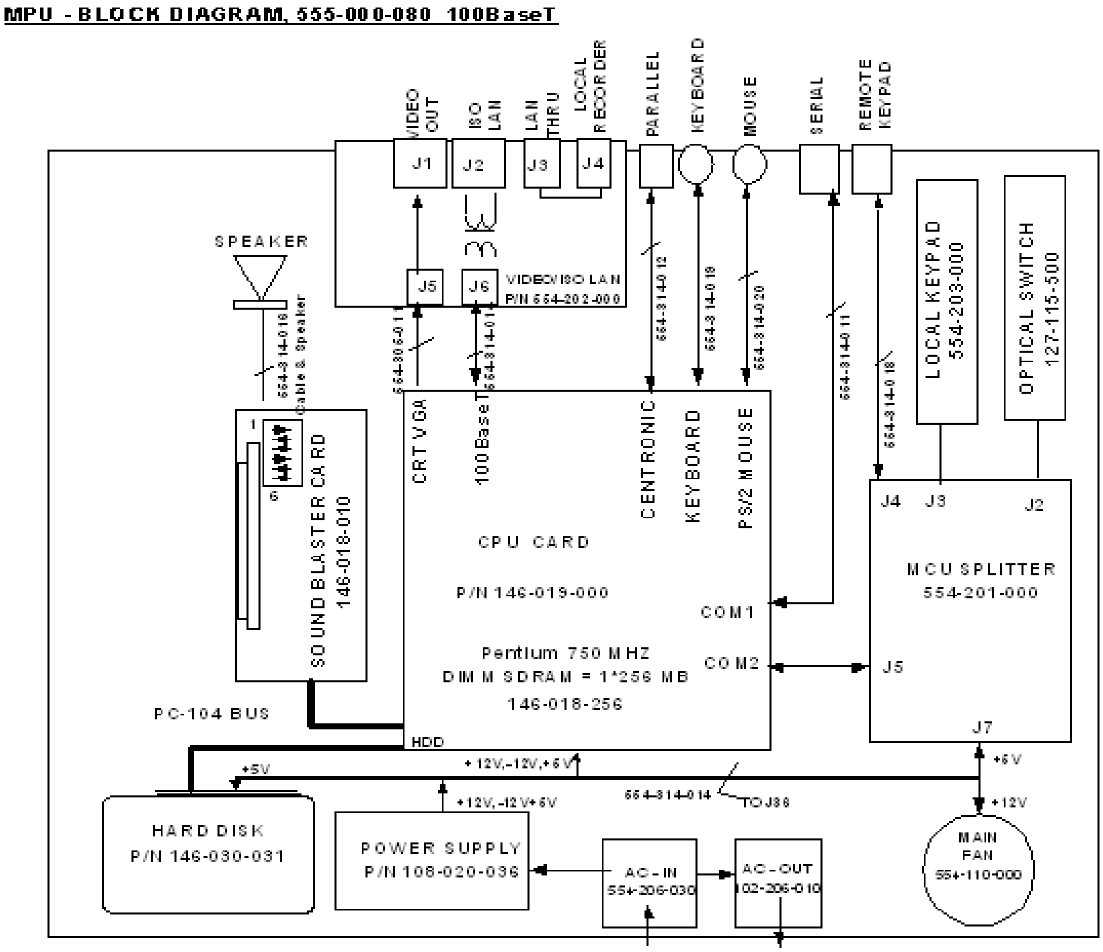

MPU - BLOCK DIAGRAM, 555-000-080 100BaseT
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
PARALLEL
KEYBOARD
MOUSE
SERIAL
REMOTE KEYPAD
J1
J2
J3
J4
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
SPEAKER
554-314-018
Cable & Speaker
554-306-011
554-314-01
554-314-012
554-314-019
554-314-020
554-314-011
554-314-018
LOCAL KEYPAD
554-203-000
OPTICAL SWITCH
127-115-500
1
6
SOUND BLASTER CARD
146-018-010
CRT VGA
100BaseT
CENTRONIC
KEYBOARD
PS/2 MOUSE
CPU CARD
P/N 146-019-000
COM1
COM2
Pentium 750 MHZ
DIMM SDRAM = 1*256 MB
146-018-256
HDD
PC-104 BUS
J4
J3
J2
MCU SPLITTER
554-201-000
J5
J7
+5V
+12V,-12V,+5V
+12V,-12V+5V
554-314-014
TO J38
+5V
+12V
HARD DISK
P/N 146-030-031
POWER SUPPLY
P/N 108-020-036
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN FAN
554-110-000

Figure 2-1E: Block Diagram of Ensemble MPU –100BaseT – P/N 555- 000-.080

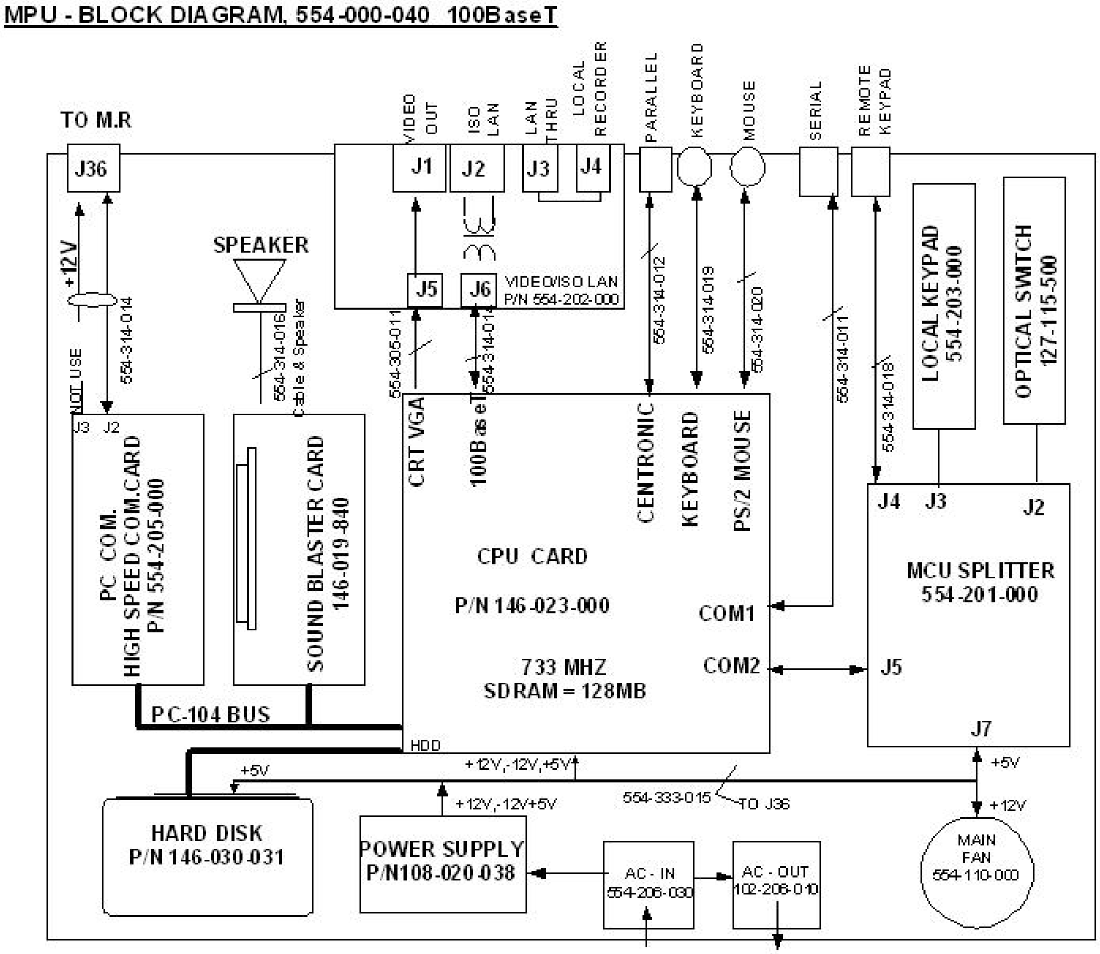

MPU - BLOCK DIAGRAM, 554-000-040 100BaseT
TO M.R
J36
+12V
NOT USE
554-314-014
J3 J2
PC COM.
HIGH SPEED COM.CARD
P/N 554-205-000
SPEAKER
554-314-016
Cable & Speaker
SOUND BLASTER CARD
146-019-840
PC-104 BUS
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
J1
J2
J3
J4
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
554-305-011
554-314-014
CRT VGA
100BaseT
PARALLEL
KEYBOARD
MOUSE
SERIAL
REMOTE KEYPAD
554-314-012
554-314-019
554-314-020
554-314-011
554-314-018
CENTRONIC
KEYBOARD
PS/2 MOUSE
CPU CARD
P/N 146-023-000
733 MHZ
SDRAM = 128MB
COM1
COM2
HDD
LOCAL KEYPAD
554-203-000
OPTICAL SWTCH
127-115-500
J4 J3 J2
MCU SPLITTER
554-201-000
J5
J7
+5V
+12V
+5V
+12V,-12V,+5V
+12V,-12V+5V
554-333-015
TO J36
HARD DISK
P/N 146-030-031
POWER SUPPLY
P/N108-020-038
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN
FAN
554-110-000

Figure 2-1F: Main Processor Unit (MPU) 554-000-040 100Base – Block Diagram

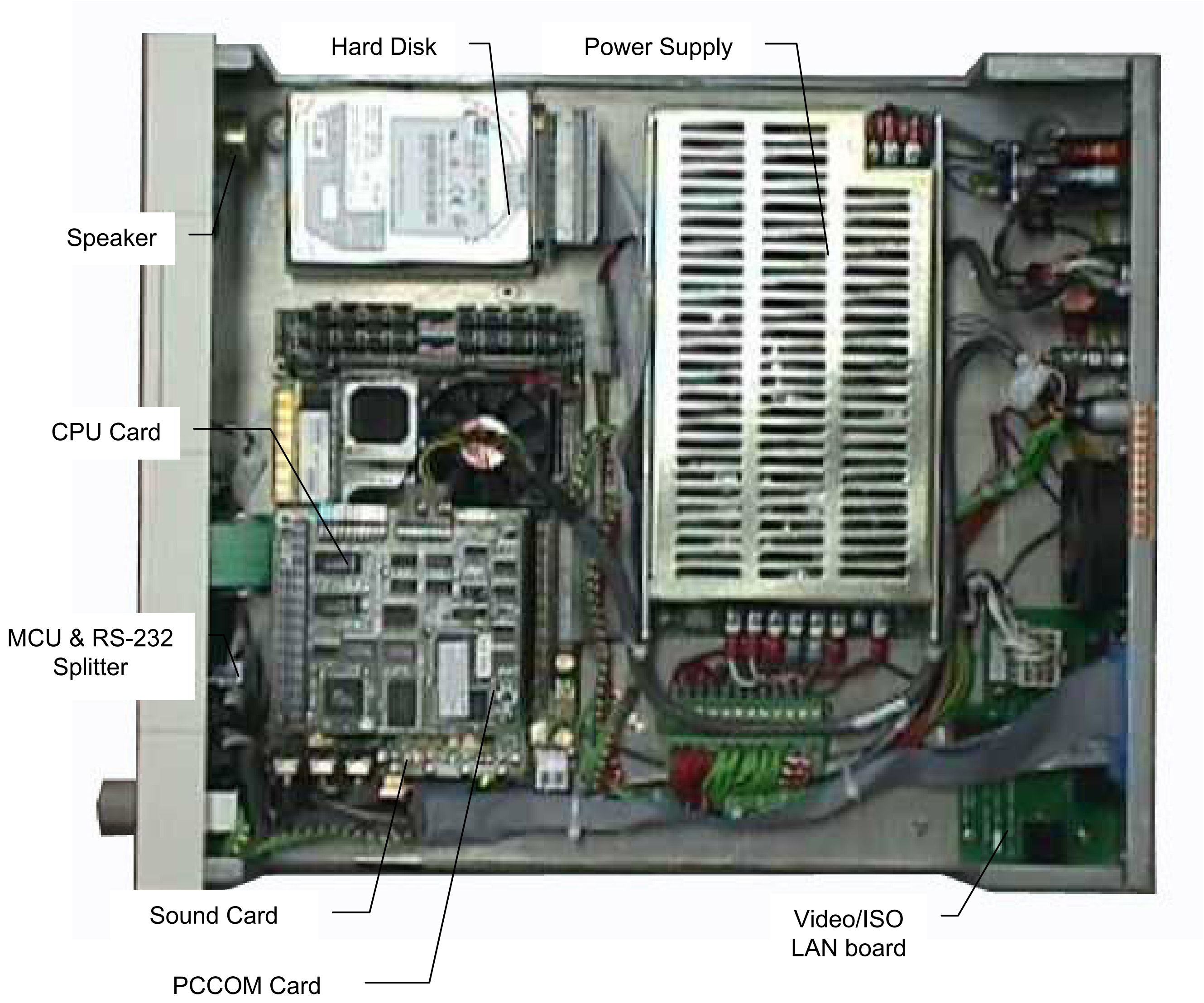

Hard Disk
Power Supply
Speaker
CPU Card
MCU & RS-232 Splitter
Sound Card
Video/ISO LAN board
PCCOM Card

Figure 2-2A. MPU Components – "Inside" main processor board

Figure 2-2B below. MPU Components – "Teknor" Viper 830 Single Board Computer

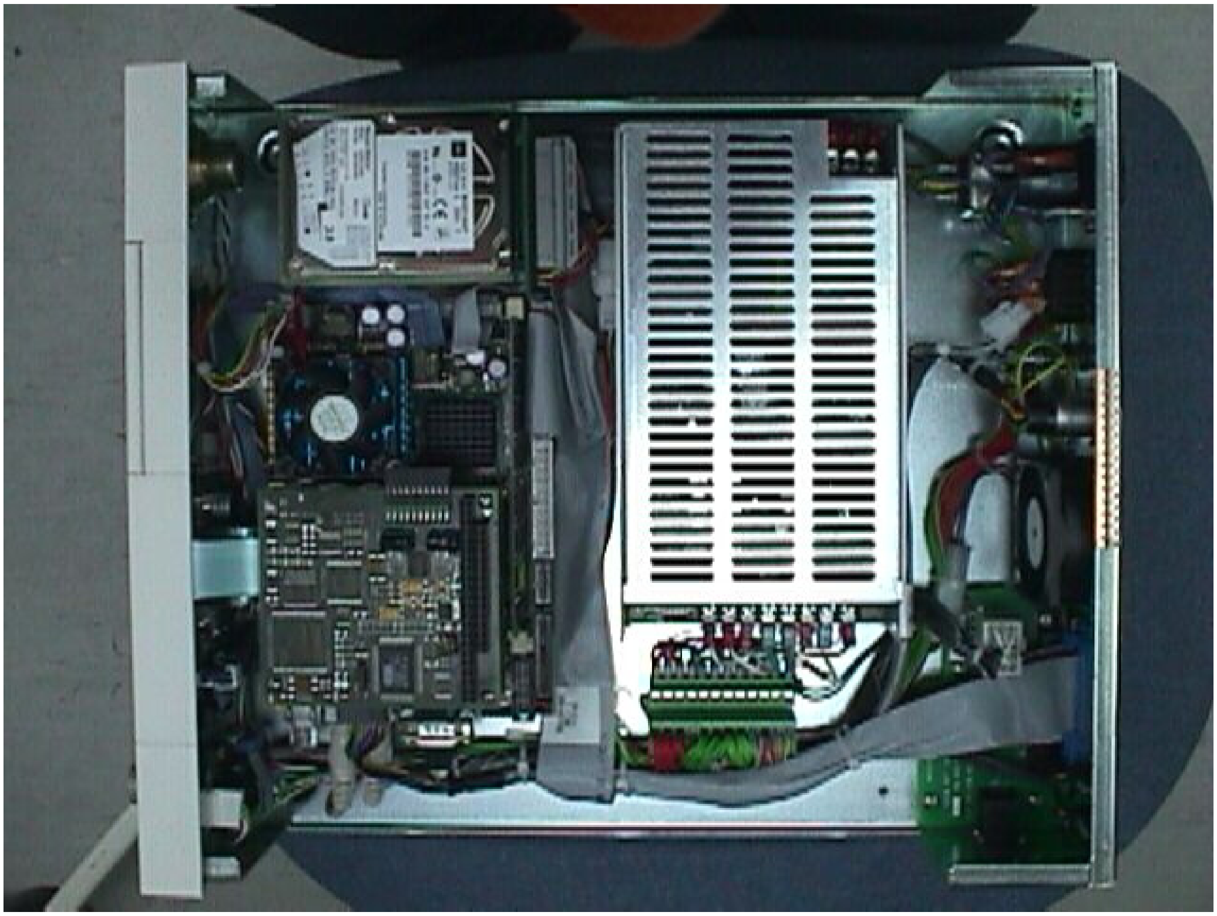
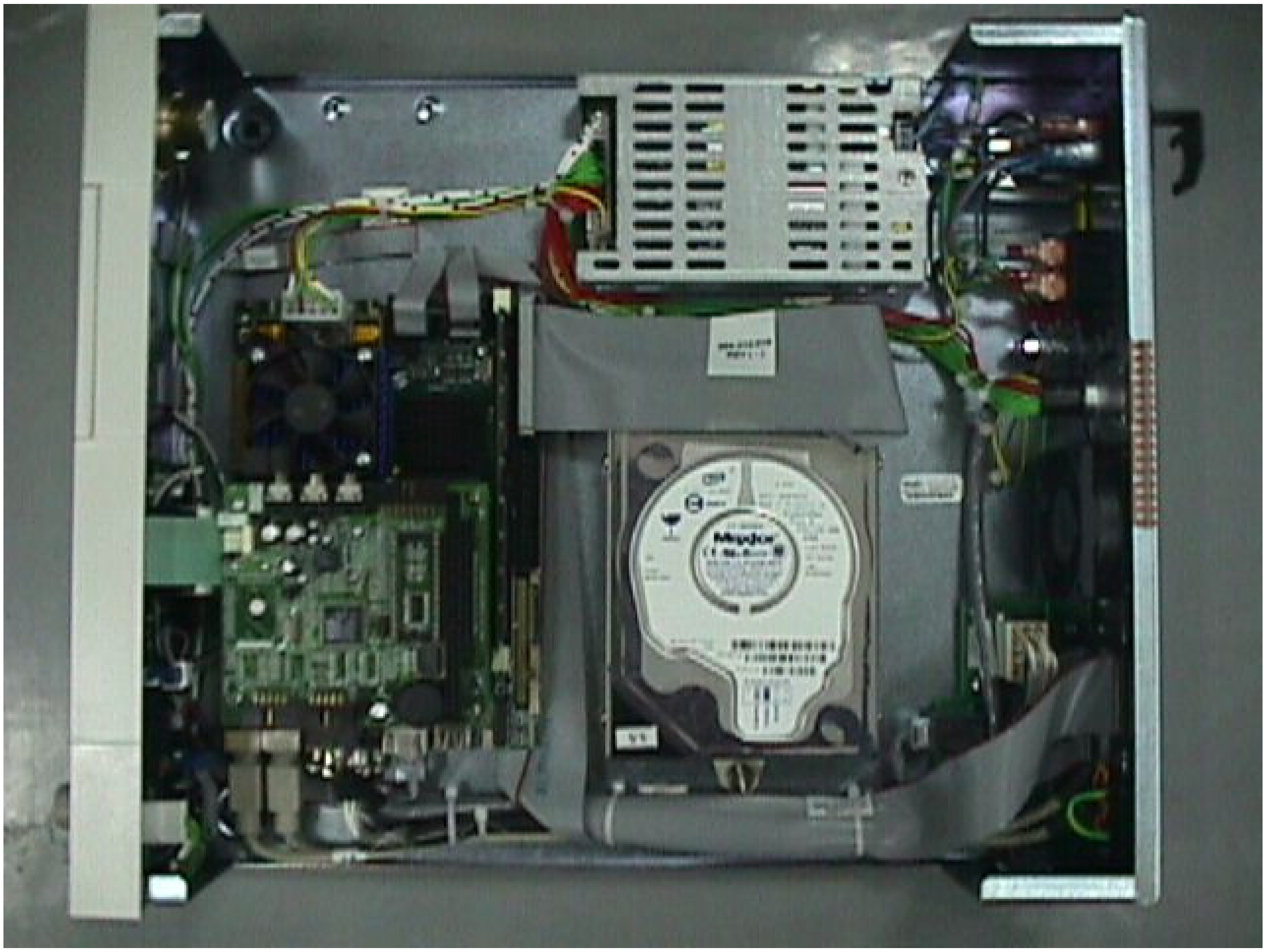


Figure 2-2C below. MPU Components – Microbus motherboard



2.1.1 CPU Card

The CPU card consists on a Pentium 133 or higher with 512 kB cache memory and 64 MB DRAM or higher. The CPU handles all the communications and processing data with the other components of the MPU and module rack.

The CPU card includes also the following:

- A video adapter output through standard connector.
- A LAN adapter interface through standard RJ-45 connector.
- Hard disk interface
- Communications ports COM 1 and COM 2
- PC/104 bus for connection to the sound card and communication card.

2.1.2 Main Storage

The main storage consists of a hard disk 1.4 GB or higher which stores the QNX operation system with PHOTON window manager and the ***Envoy*** system application software.

The MPU stores all of a patient's clinical data (vital signs and waveforms) on the hard disk. These files are retrieved when the user enters the data review panels.

- The MPU also saves configuration items and user preferences on the hard disk. A library of saved configuration sets is also maintained on the MPU's hard disk.

2.1.3 Main Power Supply

The main power supply supplies to all other components in the MPU and the module racks through the power distribution block (J59/J60) the following DC voltages:

- Output 1: + 5V ± 0.5%. Current 12.0A
- Output 2: +12V ± 3.0%. Current 3.0A (5.0A pk)
- Output 3: +12V(ISO) ± 3.0%. Current 3.0A (5.0A pk)
- Output 4: - 12V ± 3.0%. Current 3.0A
- Output 5: - 5V ± 1.0%. Current 0.6A

The output power is 110W max.

Note: Outputs 2 & 3 have the same voltage and regulation, when they are connected in parallel, output currents are added to give 6.0A .

The power supply meets UL544 or UL2601 medical standards for patient connection specifications.

The AC input voltage is 90-132/180-264 VAC at 47-63 Hz, single phase connected through the AC input filter switch (J58). This input is connected directly to the power supply and to the AC output J57 for the display monitor. This voltage is manually selected using an internal jumper or automatic selected when using a type of power supply with automatic selector. The power supply input power is 160W.

The maximum current through the AC input filter switch is 6A/250VAC. It includes dual fuse, each 3.15A, 250V, Slow Blow.

The power supply dimensions are 223.5mm x 125.7mm x 62.2mm.

Note: There is no field adjustment or repair. In case of malfunction, replace with a new power supply supplied by Mennen Medical.

2.2 MCU and RS-232 Splitter

The MCU and RS-232 Splitter provides an interface between the user console and the CPU card, and also connects three RS-232 channels to the RS-232 (COM2) of the CPU card (see *Figure 2-3*).

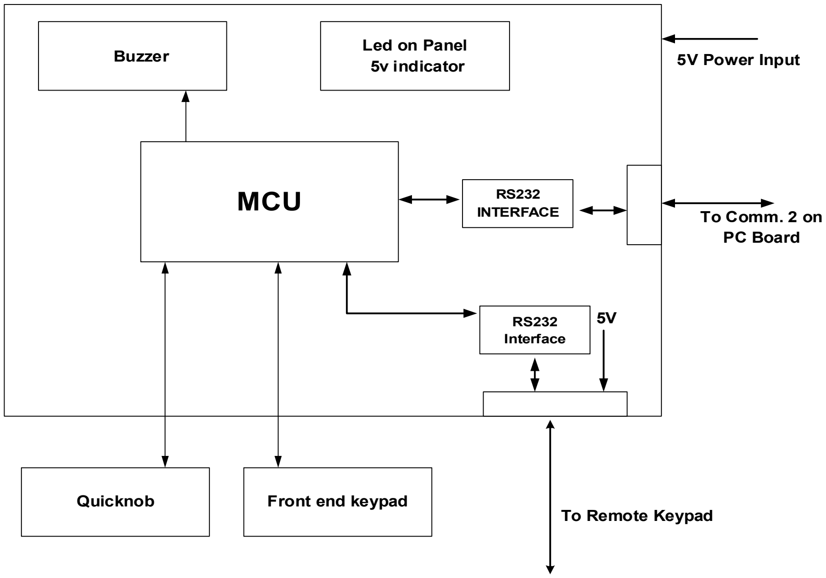


Figure 2-3. MCU and RS-232 Splitter – Block Diagram

The MCU and RS-232 Splitter has the following two functional blocks:

MCU - The MCU provides an interface to the keypad and Quicknob as well as the on-board buzzer and LED's. The MCU consists of an Intel 87C51FA 8-bit micro-controller, which has 8Kbytes of program memory, 256 bytes of RAM and 32 I/O ports.
The micro-controller provides the console components with the flexibility of software control. Firmware algorithms on the micro-controller detect keypad and Quicknob activity and produce character streams which the Envoy uses to identify the nature of the activity (which key was pressed, which direction the Quicknob was rotated, etc.). These character streams are provided via the RS232 Splitter.

RS232 Splitter - The RS-232 splitter enables communications from either one of three possible sources to enter to comm port 2: from the MCU, or from the comm port on the back panel, or from a spare auxiliary port. The operation is as follows. When one of the input channels begins to transmit, the switch branches that channel's TxD signal to the motherboard's RxD line, giving the channel exclusive communication with the CPU card.

Any subsequent data generated by the other two channels is ignored. When the first channel stops transmitting, a 15ms time window of safety is provided before the switch is freed up for another channel. This window allows time for the transmitting channel to pause and then resume transmitting.

The MCU and RS232 Splitter has two LED's, red and green, which are mounted together in a single package on the board, and it also provides current for a third LED mounted on the keypad. The red LED is used for hardware debugging and the green LED indicates firmware status (e.g. "Run"). The LED mounted on the keypad provides a "Power On" indicator for the ***Envoy***.

The on-board buzzer provides audio feedback of key-presses and Quicknob rotations. The buzzer is a piezoelectric type with a nominal tone frequency of 4100 Hz.

Figure 2-4 illustrates the connector's locations in the MCU and RS-232 board.

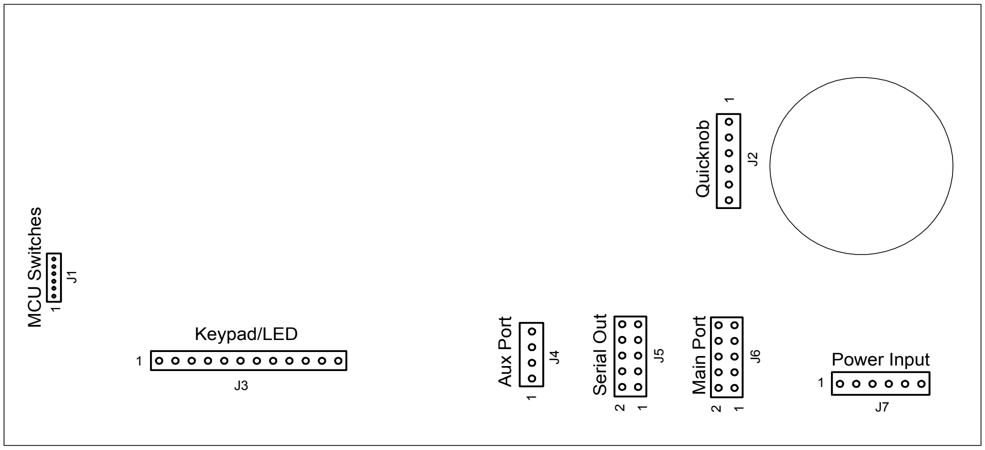


Figure 2-4. MCU and RS-232 Splitter – Connectors Locations

BIOS Setup Flash Memory

The BIOS setup flash memory provides the CPU card the necessary parameters needed for initialing the MPU after turning on or reset.

When mounting a new CPU card you must perform BIOS setup procedure. For details, see section *BIOS Setup* in *Chapter 6 – Maintenance*.

Local Keypad and QuicKnob

The local keypad includes 12 fixed keys. Each key has a specific function (for details see Chapter 1). The keypad and the Quicknob enable the user to operate the ***Envoy*** bedside monitor.

The keypad is connected to the MCU and RS-232 splitter with a flat cable through connector J3 that has 12 pins. Pins 1 through 9 are for the keypad. The keypad consists of switches arranged in a row and column matrix. Up to 5 rows and 4 columns are provided for in the interface. Identification of which key was pressed is handled by a scanning algorithm in the micro-controller. One micro-controller port is dedicated for each row and column.

The following table shows the relationship between the Row/Column labels of J3 and the switch names shown in *Figure 2-5.*

Switch	Row	Column
S1	Row1	Col1
S2	Row1	Col2
S3	Row1	Col3
S4	Row1	Col4
S5	Row2	Col1
S6	Row2	Col2
S7	Row2	Col3
S8	Row2	Col4
S9	Row3	Col1
S10	Row3	Col2
S11	Row3	Col3
S12	Row3	Col4

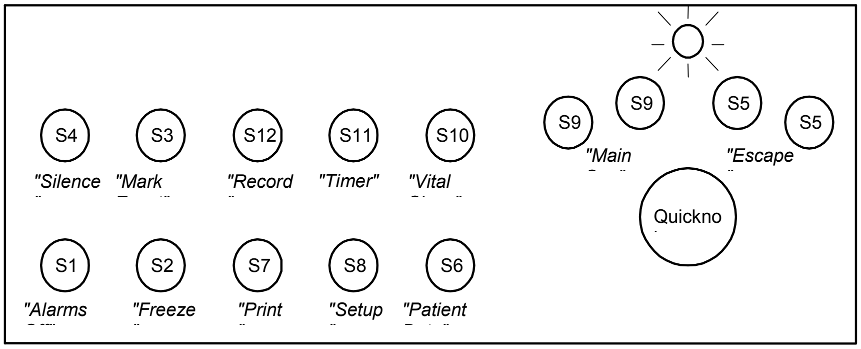

S4
"Silence
S3
"Mark
S12
"Record
S11
"Timer"
S10
"Vital
S9
S9
"Main
S5
S5
"Escape
Quickno
S1
"Alarms
S2
"Freeze
S7
"Print
S8
"Setup
S6
"Patient

Figure 2-5. Keypad Switches Layout

Pins 10 and 11 are directly connected to the console LED, providing for a power-on indicator for the Envoy. A current limiting resistor of 432Ω is mounted on the MCU and RS-232 splitter board so that the LED's anode and cathode terminals can be directly connected to the connector pins 10 and 11 respectively. Pin 12, the Chassis Ground, is connected to the keypad's metallic shield for reducing Electromagnetic Interference (EMI).

The QuicKnob is connected to the MCU and RS-232 splitter with a flat cable through connector J2 that has 6 pins. The Quicknob layout matches the pinout for the Grayhill 61 series of optical encoders.

Sound Card

The sound card provides an interface between the CPU card and the speaker mounted on front panel (see *Figure 2-6*). It converts digital output to audio signals.

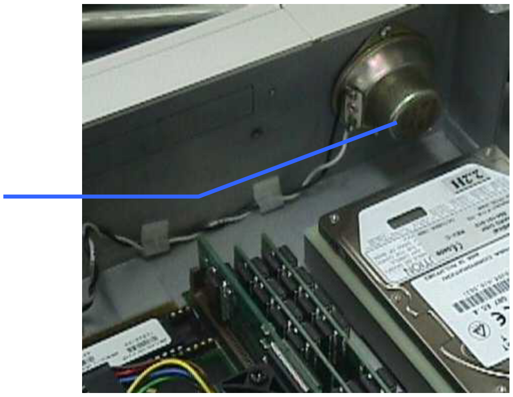


Figure 2-6. Speaker Location

The sound card is an OEM board, for more information, see manufacturer documentation.

PCCOM Board

The PCCOM board provides high-speed communication interface between the CPU card and the two module racks. The PCCOM board consists of a low-power integrated multi-protocol processor that integrates a high-speed 68LC302 processor with multiple communications peripherals. The provision of direct memory access (DMA) control and link layer management with the serial ports allows high throughput of data for communications-intensive applications.

The processor uses the following types of memory through the internal bus (see *Figure 2-7*):

Dual port memory – A 2K word dual port static RAM that serves as an I/O register and shared memory data I/O.

Local memory – A 64K SRAM memory (optional) serves as an additional memory to the dual port memory.

Flash memory – A flash memory (optional) that stores the software for the 68LC302 processor.

The PCCOM has the following interfaces:

- LVDS/RS-422 serial channel 1 through LVDS/RS-422 driver and receiver.
- LVDS/RS-422 serial channel 2 through LVDS/RS-422 driver and receiver.
- RS-232 serial channel 1 through RS-232 driver and receiver
- RS-232 serial channel 2 through RS-232 driver and receiver.

The receiver multiplexer circuit determines whether the input from the communication channels come from RS-232 receiver or from the LVDS/RS-422 receiver.

The driver multiplexer circuit determines whether the output from the communication channels come from RS-232 driver or from the LVDS/RS-422 driver.

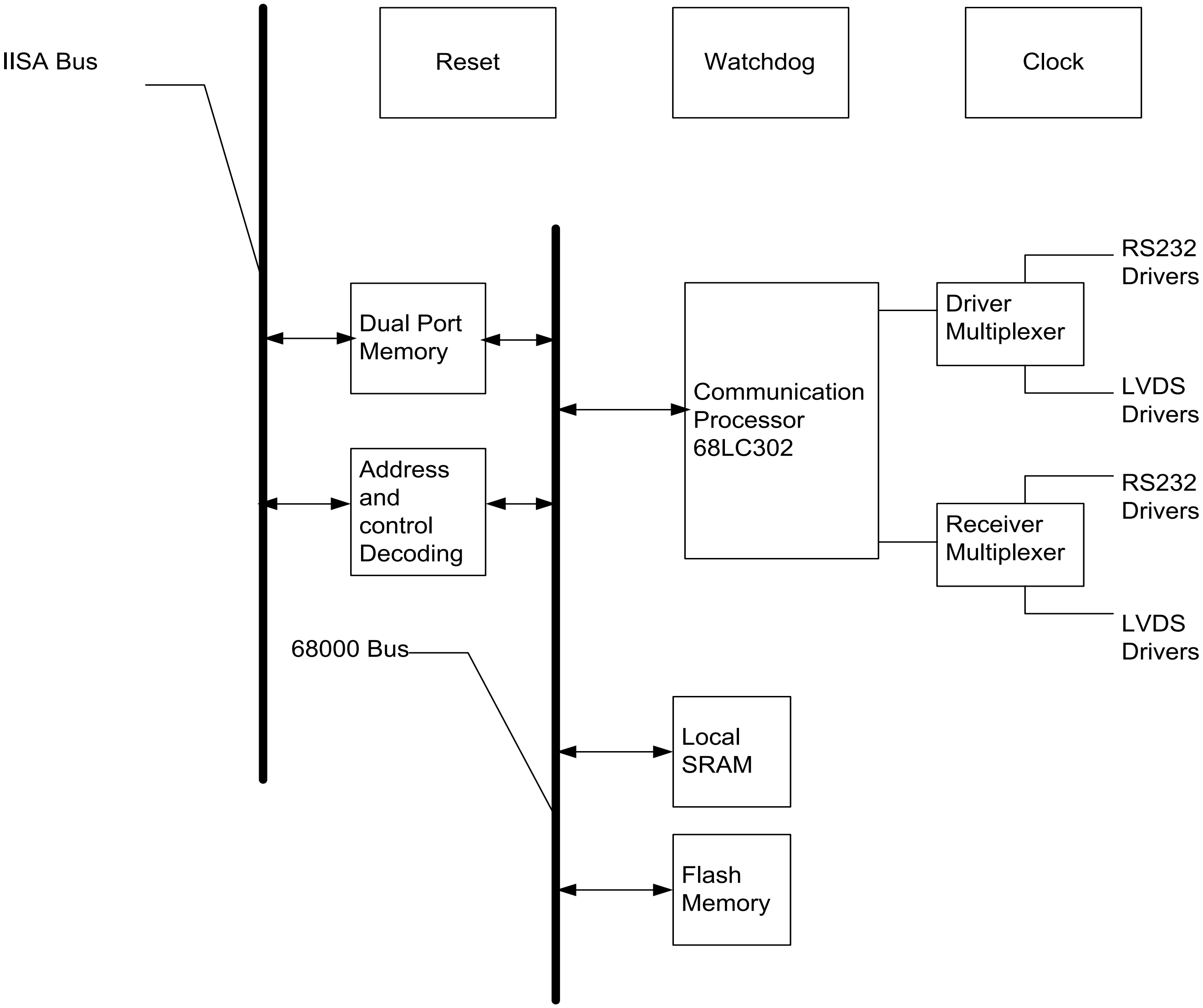

IISA Bus
Reset
Watchdog
Clock
Dual Port Memory
Address and control Decoding
68000 Bus
Communication Processor 68LC302
Driver Multiplexer
RS232 Drivers
LVDS Drivers
Receiver Multiplexer
RS232 Drivers
LVDS Drivers
Local SRAM
Flash Memory

Figure 2-7. PCCOM – Block Diagram

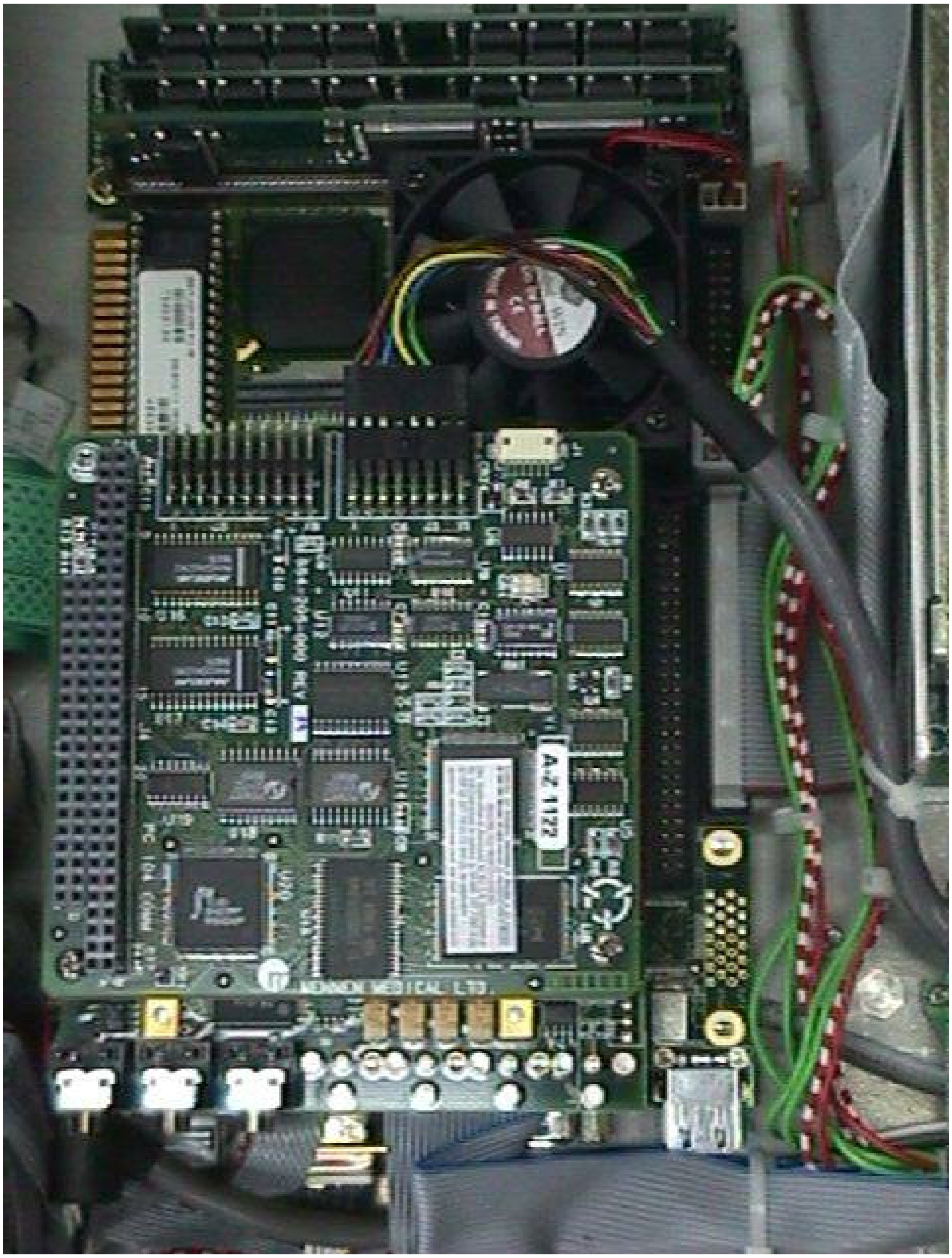
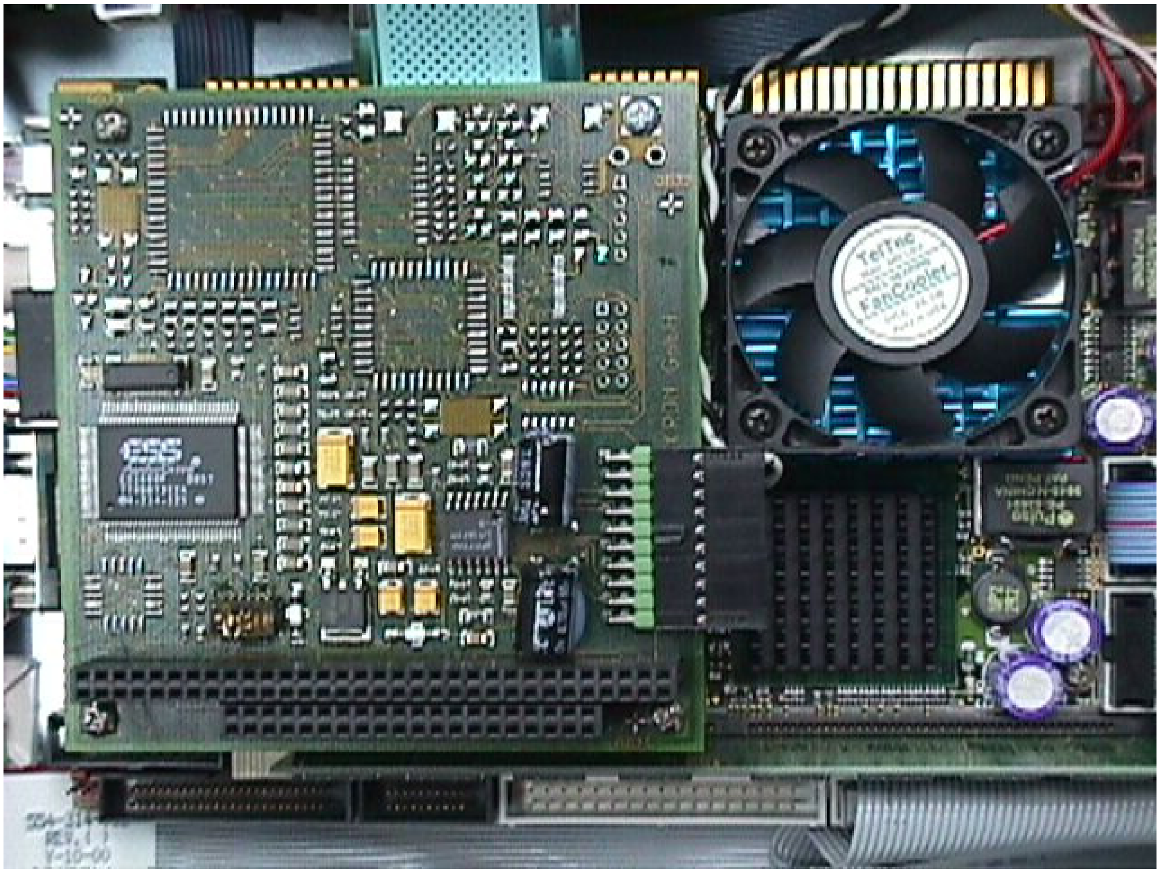


Figure 2-8A. PCCOM Location with "Inside" MainProcessor Board

Figure 2-8B below. PCCOM Location with "Teknor" Viper 830 Single Board Computer



Video/ISO LAN Board

The Video/ISO LAN board provides the following interfaces:

- Between the CPU card VGA output and the display monitor CRT-VGA connector in direct connection.
- Between the CPU card 10BaseT interface and the 10BaseT (RJ-45) connector through isolated transformer.

The Video/ISO LAN board also includes two additional RJ-45 connectors for bridging between the LAN to the local recorder (LAN Through).

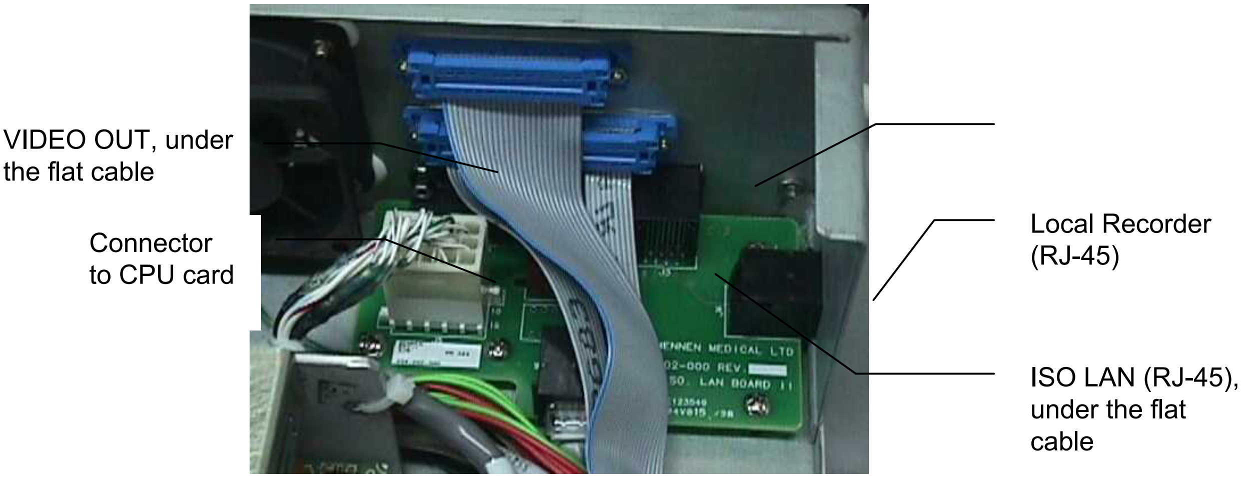

VIDEO OUT, under the flat cable
Connector to CPU card
Local Recorder (RJ-45)
ISO LAN (RJ-45), under the flat cable

Figure 2-9. Video/ISO LAN Board Location

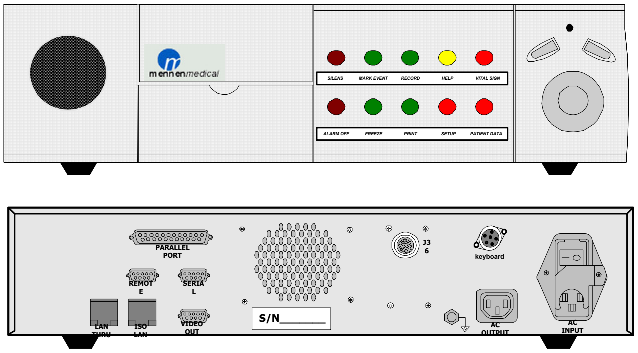
Front and Rear Panels

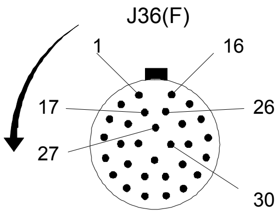
Figure 2-10A and *Figure 210B* below illustrate the front and rear panel connectors including the pin-out description.

For explanation of the front and rear panels see Chapter 1.

Figure 2-10A. Front and Rear Panel Connectors of the older model of the Envoy

Figure 2-10. Front and Rear Panels – Connectors Description


mennen medical
SILENS
MARK EVENT
RECORD
HELP
VITAL SIGN
ALARM OFF
FREEZE
PRINT
SETUP
PATIENT DATA
PARALLEL PORT
REMOTE
SERIAL
J36
keyboard
LAN THRU
ISO LAN
VIDEO OUT
S/N
AC OUTPUT
AC INPUT


J36(F)
1
16
17
26
27
30

J36
30 PIN CONN.

Signal	Pin
GND	1
GND	2
GND	3
GND	4
GND	5
GND	6
GND	7
GND	8
COM1 TX+	9
COM1 TX-	10
COM1 RX+	11
COM1 RX-	12
	13
	14
	15
COM2 TX+	16
COM2 TX-	17
COM2 RX+	18
COM2 RX-	19
CLK OUT+	20
CLK OUT-	21
+12V	22
+12V	23
+12V	24
+12V	25
+12V	26
+12V	27
+12V	28
+12V	29
	30

to M.R

PC Keyboard
5 PIN CONN.

Pin
1
2
3
4
5

Video Out
15 PIN CONN (F)

Signal	Pin
RED	1
GREEN	2
BLUE	3
	4
	5
RED GND	6
BLUE GND	7
	8
	9
	10
	11
	12
HOR SYNC	13
VER SYNC	14
	15

Parallel Port
25 PIN CONN. (F)

Signal	Pin
Strobe	1
DATA 0	2
DATA 1	3
DATA 2	4
DATA 3	5
DATA 4	6
DATA 5	7
DATA 6	8
DATA 7	9
ACK	10
BUSY	11
PAPER OUT	12
SELECT	13
AUTOFD	14
ERROR	15
INIT	16
SEL IN	17
GND	25

Remote
9 PIN CONN.(M)

Signal	Pin
	1
RXD	2
TXD	3
+5V	4
GND	5
	6
	7
	8
	9

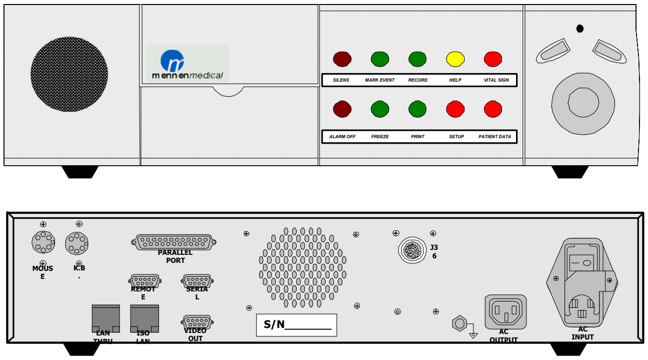
ISO LAN
8 PIN CONN (RG45)

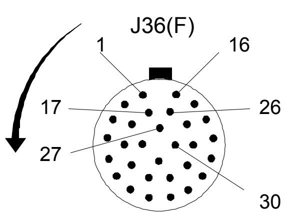
Signal	Pin
TX+	1
TX-	2
RX+	3
	4
	5
RX-	6
	7
	8

SERIAL PORT
9 PIN CONN. (M)

Signal	Pin
DCD	1
RXD	2
TXD	3
DTR	4
GND	5
DSR	6
RTS	7
CTS	8
NC	9

Figure 2-10B. Front and Rear Panel Connectors of the newer model of the Envoy


mennen medical
SILENS
MARK EVENT
RECORD
HELP
VITAL SIGN
ALARM OFF
FREEZE
PRINT
SETUP
PATIENT DATA
MOUS E
K.B .
PARALLEL PORT
REMOT E
SERIA L
J3 6
LAN THRU
ISO LAN
VIDEO OUT
S/N
AC OUTPUT
AC INPUT


J36(F)
1
16
17
26
27
30

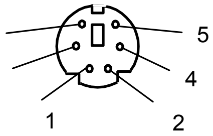
J36
30 PIN CONN.

1	GND
2	GND
3	GND
4	GND
5	GND
6	GND
7	GND
8	GND
9	COM1 TX+
10	COM1 TX-
11	COM1 RX+
12	COM1 RX-
13	
14	
15	
16	COM2 TX+
17	COM2 TX-
18	COM2 RX+
19	COM2 RX-
20	CLK OUT+
21	CLK OUT-
22	+12V
23	+12V
24	+12V
25	+12V
26	+12V
27	+12V
28	+12V
29	+12V
30	

to M.R

PC Keyboard
6 PIN CONN.

1	DATA
2	N/C
3	GND
4	VCC
5	CLK
6	N/C



Mouse
6 PIN CONN.

1	DATA
2	N/C
3	GND
4	VCC
5	CLK
6	N/C

Video Out
15 PIN CONN (F)

RED	1
GREEN	2
BLUE	3
	4
	5
RED GND	6
GREEN GND	7
BLUE GND	8
	9
	10
	11
	12
HOR SYNC	13
VER SYNC	14
	15

Parallel Port
25 PIN CONN. (F)

Strobe	1
DATA 0	2
DATA 1	3
DATA 2	4
DATA 3	5
DATA 4	6
DATA 5	7
DATA 6	8
DATA 7	9
ACK	10
BUSY	11
PAPER OUT	12
SELECT	13
AUTOFD	14
ERROR	15
INIT	16
SEL IN	17
GND	25

Remote
9 PIN CONN.(M)

	1
RXD	2
TXD	3
+5V	4
GND	5
	6
	7
	8
	9

ISO LAN
8 PIN CONN (RG45)

TX+	1
TX-	2
RX+	3
	4
	5
RX-	6
	7
	8

SERIAL PORT
9 PIN CONN. (M)

DCD	1
RXD	2
TXD	3
DTR	4
GND	5
DSR	6
RTS	7
CTS	8
NC	9

2.3 Module Rack Functional Description

2.3.1 Overview

The module rack provides the mechanical, electrical and communication platform for the modules. The module rack physically holds the modules by providing 6 slots for inserting standard modules. Modularity means that the size and the connection of the modules are standard, therefore the location of the modules can be changed without interfering with functionality. Most modules are single sized modules, fitting into a single slot. Some are double sized, fitting into two slots.

The modules receive power from the MPU through the module rack.

The module rack acts as the communication link between the modules and the main processing unit (MPU). It communicates with the MPU and the modules placed in it. The module rack can operate as a single unit in one module rack configuration, or as the master/slave in two module racks configuration.

Figure 2-11 shows a general view of the module rack and its connectors to the MPU and a second module rack (slave).

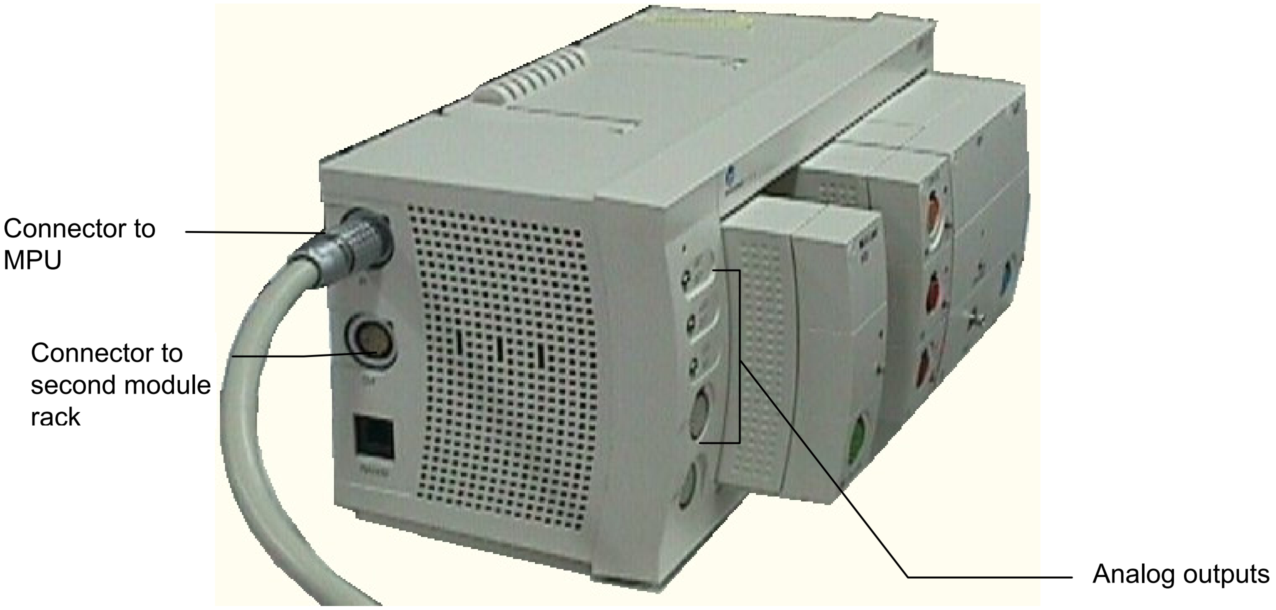


Figure 2-11. Module Rack – General View

2.3.2 Module Rack Capabilities and Features

The module rack includes the following main capabilities and features:

Power management -	The module rack detects insertion and extraction of the modules, and provides power to the modules. The sources of the power supply are the MPU or another module rack. The module rack also detects Over-Current failures on the module power supply and handles the Over-Current failures by identifying and disabling the problematic module.
Communication -	The module rack provides full duplex asynchronous communication on two different speeds with the modules, battery and slave module rack (ECG has a separate channel for this purpose). Simultaneously, it provides high speed full duplex communication with MPU.
Modules management -	The module rack enables 'hot insertion' method, this means that each module can be connected and disconnected at any time during operation. Each module can be inserted to any slot. The module rack can manage several modules of the same type (except ECG module). The module rack recognizes which module was inserted or extracted in order to update an attending list.
Real time synchronization -	The module rack provides real time clock to synchronize all the modules connected to it.
D/A conversion -	The module rack converts digital signal from the ECG/Respiration and BP modules to analog signals. Analog Output (on rack, after isolation) is used for Defibrillator, iBP (ART) for IABP and Resp Waveform.
System management -	The system management function includes the Program Loader, module rack Identification, Self-Test, Watchdog and Recovery.

2.3.3 Block Diagram Description

The module rack consists of the following three boards:

- Module rack controller
- Module rack mother-board
- Module rack analog output

See Figure 2-13 for simplified block diagram.

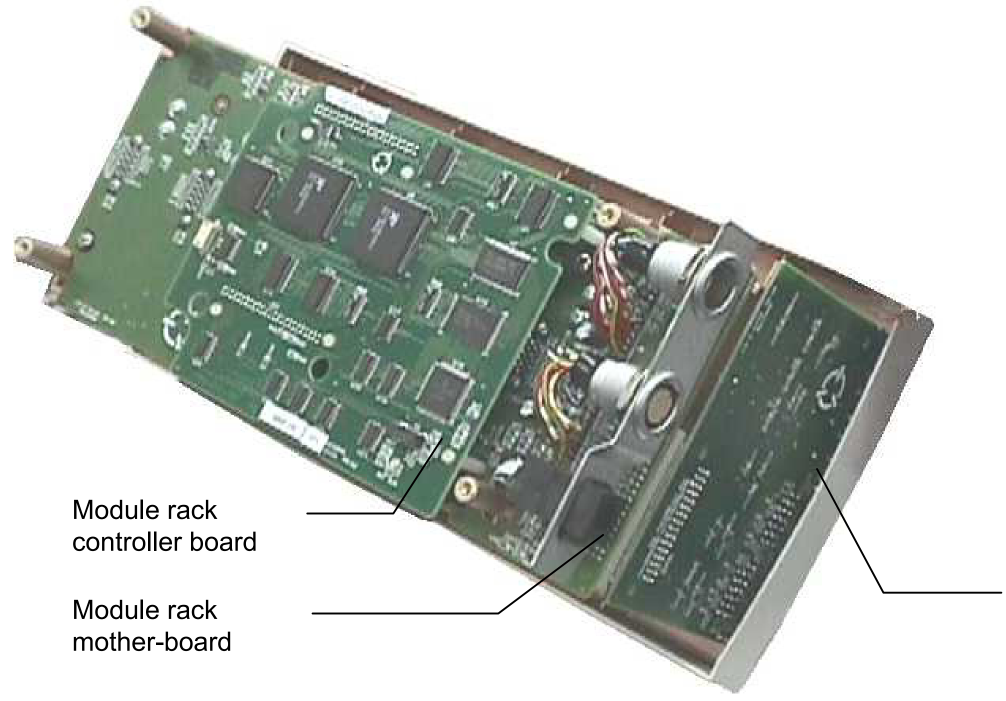

Module rack controller board
Module rack mother-board

Figure 2-12. Module Rack – inside view

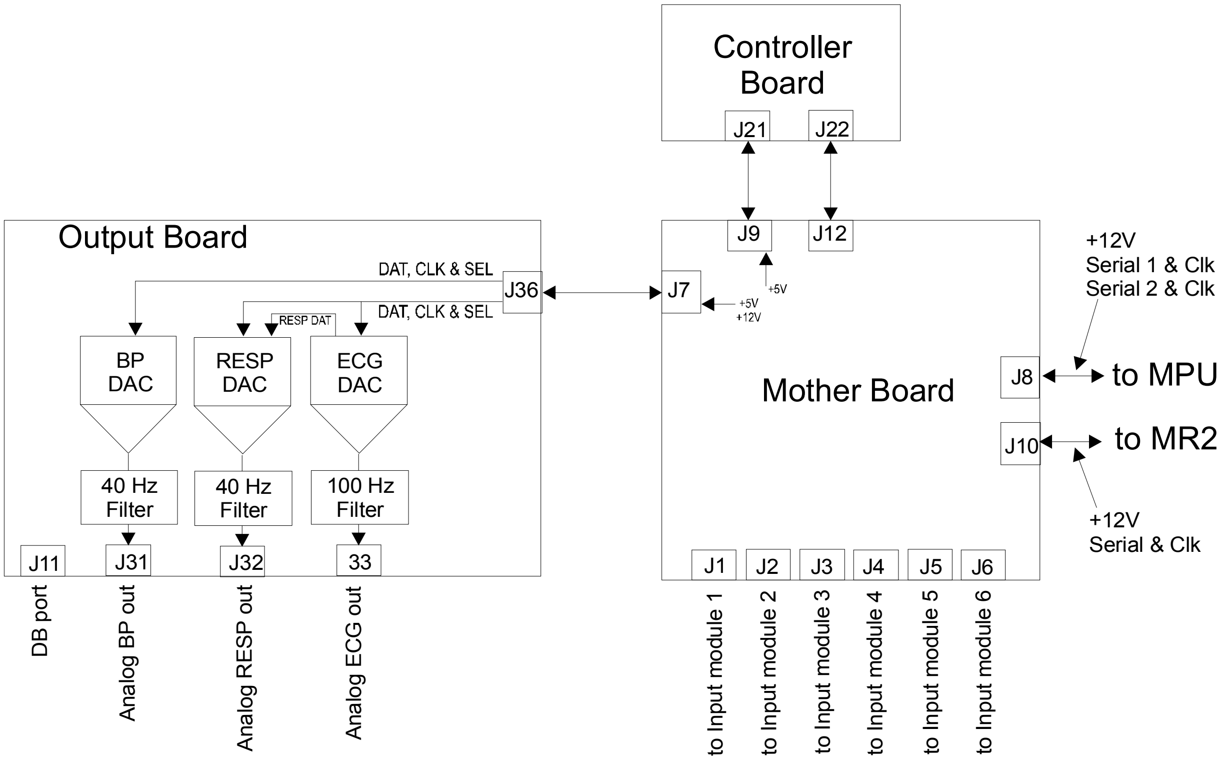

Controller Board
J21
J22
Output Board
DAT, CLK & SEL
J36
J7
J9
J12
+5V
+5V
+12V
RESP DAT
DAT, CLK & SEL
BP DAC
RESP DAC
ECG DAC
40 Hz Filter
40 Hz Filter
100 Hz Filter
J11
J31
J32
33
DB port
Analog BP out
Analog RESP out
Analog ECG out
Mother Board
+12V
Serial 1 & Clk
Serial 2 & Clk
J8
to MPU
J10
to MR2
+12V
Serial & Clk
J1
J2
J3
J4
J5
J6
to Input module 1
to Input module 2
to Input module 3
to Input module 4
to Input module 5
to Input module 6

Figure 2-13. Module Rack – Simplified Block Diagram

2.3.4 Module Rack Controller Board

The module rack controller consists of Integrated Multi-protocol Processor (IMP) MC68LC302 from Motorola. It supports all control and communication functions of the module rack.

The controller includes also UARTs (Universal Asynchronous Receiver Transmitter) that handle the communication with the modules.

2.3.5 Module Rack Motherboard

The module rack motherboard consists of following:

- Internal connectors to the module rack controller (J9 and J12) and module rack output board (J7).
- Connectors to the modules (J1 – J6)
- Connectors to the MPU (J8), MR2 (J10)
- TransZorbs for ESD protection
- Capacitors filters for EMI protection
- Power distribution circuits that consist on DC-DC converters, over-current protection and power sensing circuit.

- DAC bus multiplexers for multiplexing the digital output from the modules to the DAC inputs.
- Two ground studs in each slot, the first connects to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then second connects to the GND of module rack to provide reference for signals between the module and module rack

2.3.6 Module Rack Analog Output Board

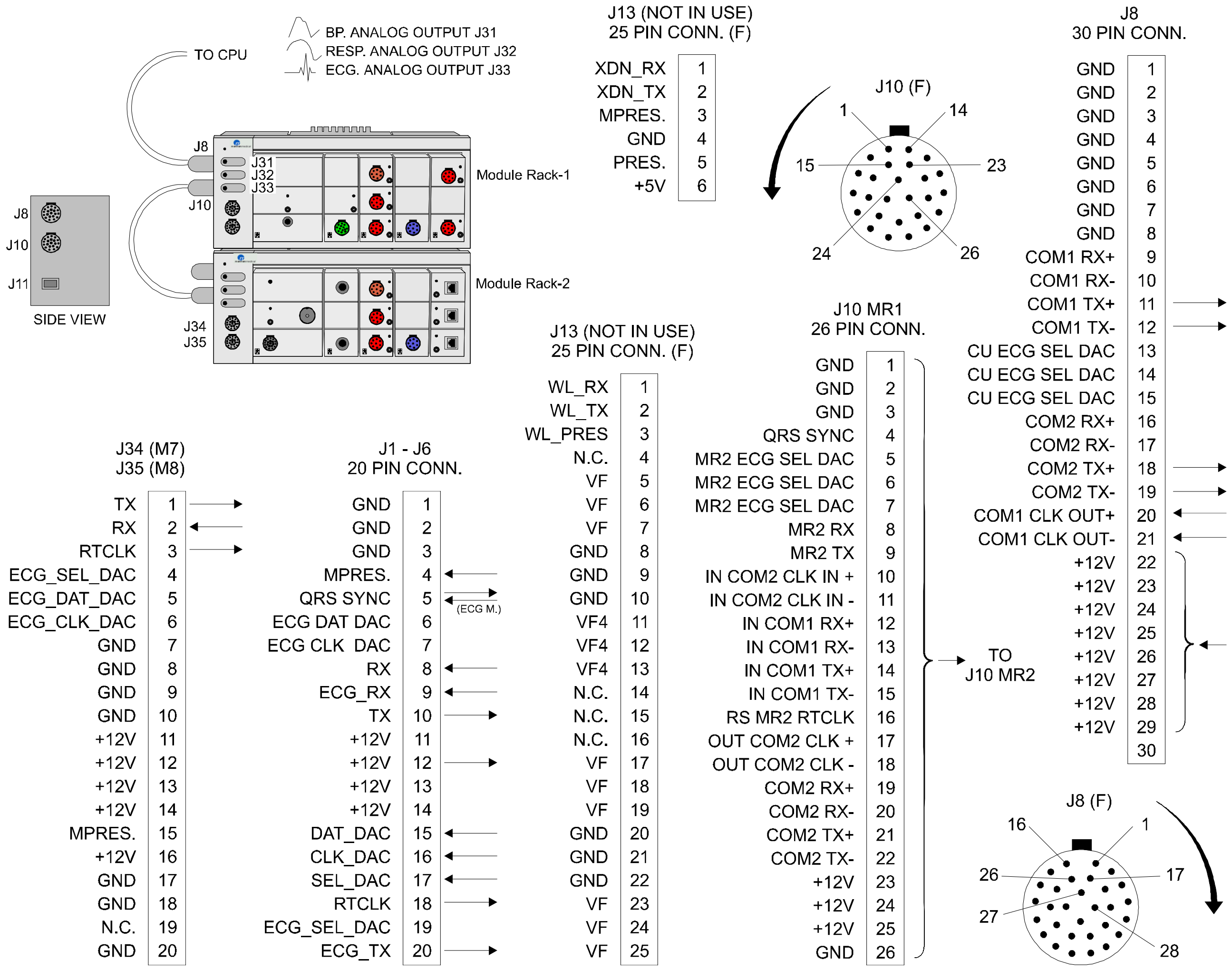
The output board consists on BP DAC, RESP DAC, ECG DAC and three filters. The ECG and Respiration DACs are connected in series (ECG DAC first and Respiration DAC second). Each DAC receives data through DAC bus, which contains three signals: Data, Clock and Select. These signals are supported by the source of the DAC_bus.

The source of DAC_bus can be as follows: six local modules and the CPU of the module rack. The local modules may support DAC_bus signals to produce analog waveforms and for synchronization of neighboring modules. The CPU of the module rack may support these signals to provide test signals or to generate some special waveforms on analog outputs.

There are two DAC_buses - ECG/Respiration DAC_bus and BP DAC_bus. Each source may support only one of DAC_buses in the same time.

Selection of source provided by DAC_bus multiplexers under control of module rack's CPU.

2.3.7 Module Rack Connectors


TO CPU
BP. ANALOG OUTPUT J31
RESP. ANALOG OUTPUT J32
ECG. ANALOG OUTPUT J33
J8
J31
J32
J33
J10
Module Rack-1
Module Rack-2
J34
J35
J8
J10
J11
SIDE VIEW
J10 (F)
1
14
15
23
24
26
J8 (F)
16
1
26
17
27
28

J13 (NOT IN USE)
25 PIN CONN. (F)

XDN_RX	1
XDN_TX	2
MPRES.	3
GND	4
PRES.	5
+5V	6

J8
30 PIN CONN.

GND	1	
GND	2	
GND	3	
GND	4	
GND	5	
GND	6	
GND	7	
GND	8	
COM1 RX+	9	
COM1 RX-	10	
COM1 TX+	11	→
COM1 TX-	12	→
CU ECG SEL DAC	13	
CU ECG SEL DAC	14	
CU ECG SEL DAC	15	
COM2 RX+	16	
COM2 RX-	17	
COM2 TX+	18	→
COM2 TX-	19	→
COM1 CLK OUT+	20	←
COM1 CLK OUT-	21	←
+12V	22	←
+12V	23	
+12V	24	
+12V	25	
+12V	26	
+12V	27	
+12V	28	
+12V	29	
	30	

J13 (NOT IN USE)
25 PIN CONN. (F)

WL_RX	1
WL_TX	2
WL_PRES	3
N.C.	4
VF	5
VF	6
VF	7
GND	8
GND	9
GND	10
VF4	11
VF4	12
VF4	13
N.C.	14
N.C.	15
N.C.	16
VF	17
VF	18
VF	19
GND	20
GND	21
GND	22
VF	23
VF	24
VF	25

J10 MR1
26 PIN CONN.

GND	1	→ TO J10 MR2
GND	2	
GND	3	
QRS SYNC	4	
MR2 ECG SEL DAC	5	
MR2 ECG SEL DAC	6	
MR2 ECG SEL DAC	7	
MR2 RX	8	
MR2 TX	9	
IN COM2 CLK IN +	10	
IN COM2 CLK IN -	11	
IN COM1 RX+	12	
IN COM1 RX-	13	
IN COM1 TX+	14	
IN COM1 TX-	15	
RS MR2 RTCLK	16	
OUT COM2 CLK +	17	
OUT COM2 CLK -	18	
COM2 RX+	19	
COM2 RX-	20	
COM2 TX+	21	
COM2 TX-	22	
+12V	23	
+12V	24	
+12V	25	
GND	26	

J34 (M7)
J35 (M8)

TX	1	→
RX	2	←
RTCLK	3	→
ECG_SEL_DAC	4	
ECG_DAT_DAC	5	
ECG_CLK_DAC	6	
GND	7	
GND	8	
GND	9	
GND	10	
+12V	11	
+12V	12	
+12V	13	
+12V	14	
MPRES.	15	
+12V	16	
GND	17	
GND	18	
N.C.	19	
GND	20	

J1 - J6
20 PIN CONN.

GND	1	
GND	2	
GND	3	
MPRES.	4	←
QRS SYNC	5	⇄ (ECG M.)
ECG DAT DAC	6	
ECG CLK DAC	7	
RX	8	←
ECG_RX	9	←
TX	10	→
+12V	11	
+12V	12	→
+12V	13	
+12V	14	
DAT_DAC	15	←
CLK_DAC	16	←
SEL_DAC	17	←
RTCLK	18	→
ECG_SEL_DAC	19	
ECG_TX	20	→

Figure 2-14. Module Rack – External Connectors

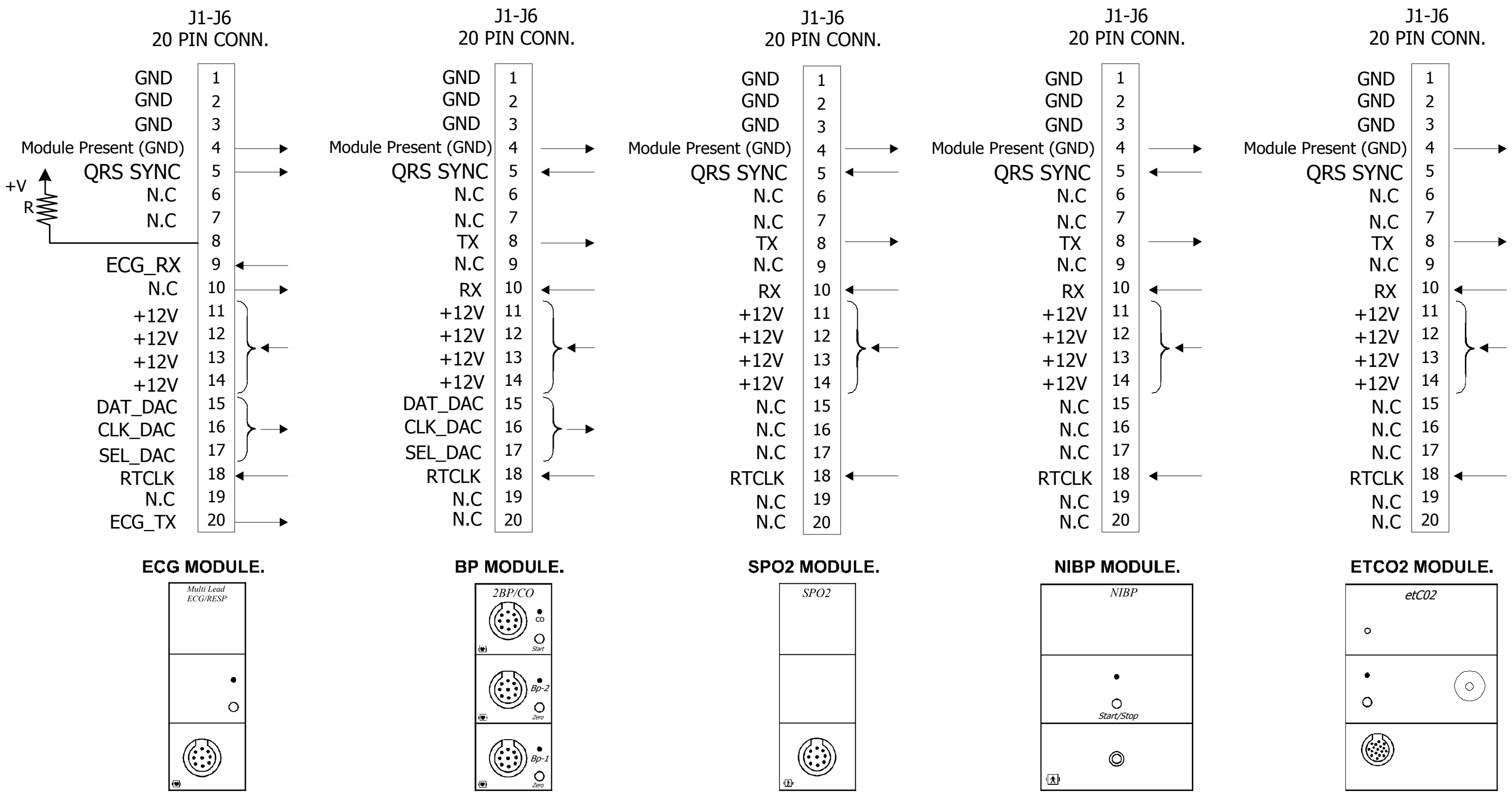

J1-J6
20 PIN CONN.
GND 1
GND 2
GND 3
Module Present (GND) 4
QRS SYNC 5
+V
R
N.C 6
N.C 7
8
ECG_RX 9
N.C 10
+12V 11
+12V 12
+12V 13
+12V 14
DAT_DAC 15
CLK_DAC 16
SEL_DAC 17
RTCLK 18
N.C 19
ECG_TX 20
ECG MODULE.
Multi Lead ECG/RESP
J1-J6
20 PIN CONN.
GND 1
GND 2
GND 3
Module Present (GND) 4
QRS SYNC 5
N.C 6
N.C 7
TX 8
N.C 9
RX 10
+12V 11
+12V 12
+12V 13
+12V 14
DAT_DAC 15
CLK_DAC 16
SEL_DAC 17
RTCLK 18
N.C 19
N.C 20
BP MODULE.
2BP/CO
CO
Start
Bp-2
Zero
Bp-1
Zero
J1-J6
20 PIN CONN.
GND 1
GND 2
GND 3
Module Present (GND) 4
QRS SYNC 5
N.C 6
N.C 7
TX 8
N.C 9
RX 10
+12V 11
+12V 12
+12V 13
+12V 14
N.C 15
N.C 16
N.C 17
RTCLK 18
N.C 19
N.C 20
SPO2 MODULE.
SPO2
J1-J6
20 PIN CONN.
GND 1
GND 2
GND 3
Module Present (GND) 4
QRS SYNC 5
N.C 6
N.C 7
TX 8
N.C 9
RX 10
+12V 11
+12V 12
+12V 13
+12V 14
N.C 15
N.C 16
N.C 17
RTCLK 18
N.C 19
N.C 20
NIBP MODULE.
NIBP
Start/Stop
J1-J6
20 PIN CONN.
GND 1
GND 2
GND 3
Module Present (GND) 4
QRS SYNC 5
N.C 6
N.C 7
TX 8
N.C 9
RX 10
+12V 11
+12V 12
+12V 13
+12V 14
N.C 15
N.C 16
N.C 17
RTCLK 18
N.C 19
N.C 20
ETCO2 MODULE.
etC02

Figure 2-15A Module Rack – Input Modules Connectors

2.4 Display Monitor

The display monitor is a standard monitor and can be one of the following five types:

- 15” screen size
- 17” screen size
- 20” screen size
- 15” flat display TFT
- 18” flat display TFT
- 20” flat display TFT

Use only a display screen that has been approved by Mennen Medical – this refers to both the model and size of the screen.

The power supply is connected directly from the AC output of the MPU. The Power LED usually operates as follows:

- Green LED indicates that the power and the video signal exist.
- Amber LED indicates that power exists but there is no video signal.

Each one of the display monitors has its own features and capabilities. The controls are set for default operation by the factory. For information about the operating and maintaining the display monitor, refer to the manufacturer manual.

Every display monitor can be mounted on the MCU in one of two options: split or not split.

Notes: a) It is recommended to power on the display monitor through the MPU and leave the power switch of the display monitor in ON position.
b) To prevent smearing of color, it is recommended to turn off and on the power ones a week for at least one minute.

Warning

Use only a display screen that has been approved by Mennen Medical – this refers to both the model and size of the screen.

2.5 Remote Keypad and QuicKnob Functional Description

The remote keypad and QuicKnob (Remote) enables the user to operate the ***Envoy*** system through an external cable connected to the Auxiliary port of the MPU. The Remote performs the same functions as the local keypad and QuicKnob located in the MPU.

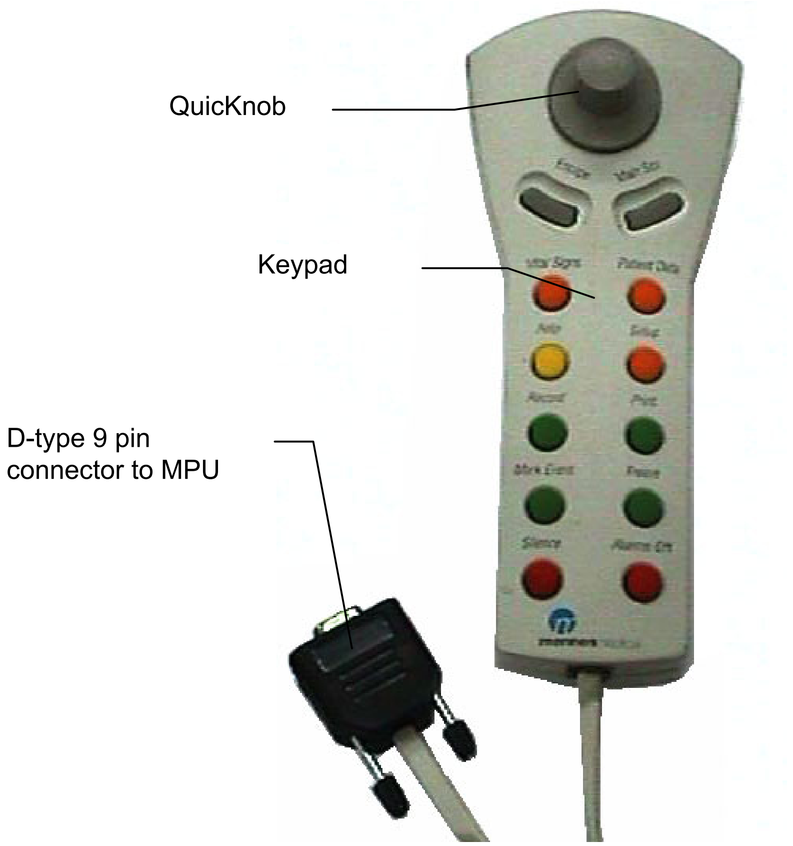

QuicKnob
Keypad
D-type 9 pin connector to MPU
Vital Signs
Patient Data
Auto
Setup
Record
Print
Mark Event
Freeze
Silence
Alarms Off
mennen

Figure 2-16. Remote Keypad – General View

The Remote consists of 12 fixed keys, QuicKnob, LEDs, buzzer, MCU and RS-232 interface (see *Figure 2-18*).

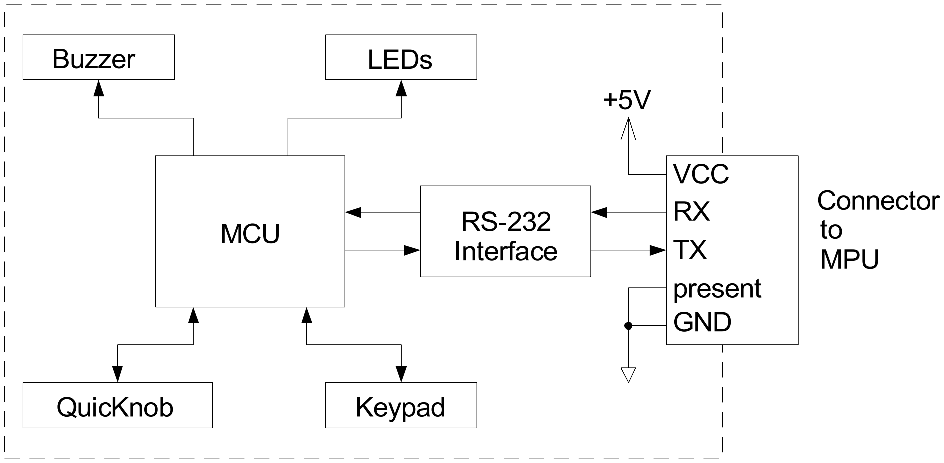

Buzzer
LEDs
+5V
MCU
RS-232
Interface
VCC
RX
TX
present
GND
Connector
to
MPU
QuicKnob
Keypad

Figure 2-17. Remote - Block Diagram

The MCU, QuicKnob, Keypad and Buzzer are the same as found in the MCU and RS-232 Splitter. The LEDs provide debugging indicators to assist in firmware development and service of the board. The RS-232 Interface converts the MCU's CMOS signal levels to the MPU's RS-232 level signals.

The connection to the MPU includes power for the Remote that is provided by the MPU via the MCU and RS232 Splitter's +5V supply. The terminal labeled "present" allows the MPU to determine if the Remote is plugged in.

2.6 P&SB Module Functional Description

2.6.1 Overview

The Processing and Storage Block (P&SB) performs local data storage and protocol translation from low level protocol, to high level NGMS protocol. The P&SB is part of various 550-Series modules, such as the proprietary modules: 2BP, CO, Temp and ECG, and OEM modules: EtCO2 and SpO2.

Block Diagram Description

The P&SB board consists on a low power integrated multi-protocol processor (IMP) that integrates a high-speed 68LC302 processor with multiple communications peripherals. The provision of direct memory access (DMA) control and link layer management with the serial ports allows high throughput of data for communications-intensive applications.

The processor uses the following types of memory through the internal bus (see Figure 3-18):

Program flash memory – A flash memory (1Mbit, 4Mbit or 8Mbit) that stores the program code for the 68LC302 processor. The flash memory has 16-bit wide data bus allowing performance of word-wide read and write operations.

Data flash memory – A flash memory (2Mbit, 4Mbit or 8Mbit) that stores the data (such as charts, trends, etc) provided by the module input device. The data flash memory has 16-bit wide data bus (two 8-bit wide) allowing performance of word-wide read and write operations. The flash memory supports periodic data refresh.

Static RAM – 1Mbit or 4Mbit SRAM memory (optional) that serves as additional memory for performing word-wide read and write operations. The Static RAM has 16-bit wide data bus

The P&SB has the following interfaces:

- Two independent full-duplex Serial Communications Controllers (SCC) supporting various protocols and one SCP for synchronous communication.
- 20 parallel Input / Output (I/O) ports, some with interrupt capability. In addition to IMP I/O ports, the P&SB provides 16 memory-mapped output ports for system controls and indications.

The IMP has on-chip oscillator and phased locked loop (PLL) and use the 32.768 kHz crystal as IMP clock reference.

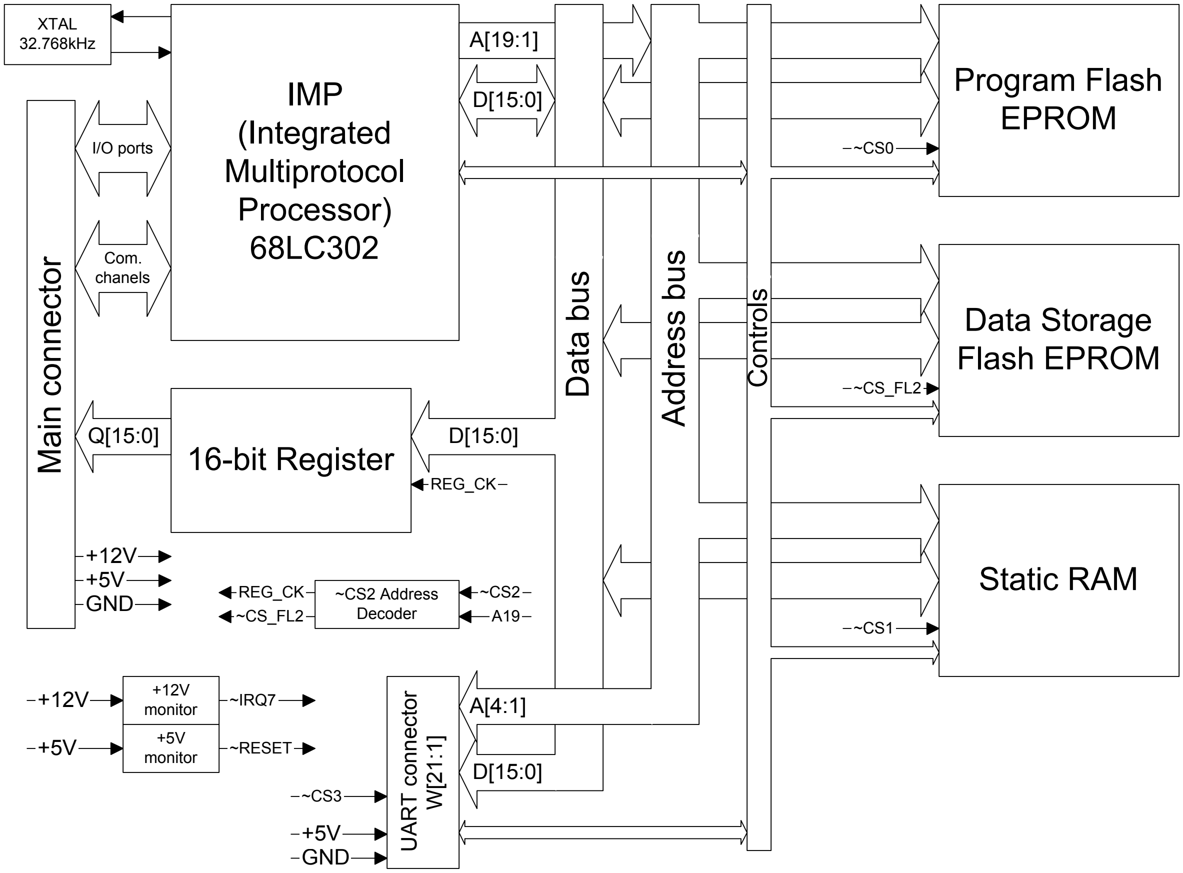

XTAL
32.768kHz
IMP
(Integrated
Multiprotocol
Processor)
68LC302
I/O ports
Com.
chanels
Main connector
A[19:1]
D[15:0]
Data bus
Address bus
Controls
Program Flash
EPROM
~CS0
Data Storage
Flash EPROM
~CS_FL2
Static RAM
~CS1
Q[15:0]
16-bit Register
D[15:0]
REG_CK
+12V
+5V
GND
REG_CK
~CS_FL2
~CS2 Address
Decoder
~CS2
A19
+12V
+12V
monitor
~IRQ7
+5V
+5V
monitor
~RESET
UART connector
W[21:1]
A[4:1]
D[15:0]
~CS3
+5V
GND

Figure 2-18. P&SB Module - Block Diagram

Connectors Description

The P&SB includes the following connectors:

J1 – A 60-pin receptacle type connector for the FE PCB interface.

J2 – A 6-pin header type connector to allow external devices to control boot process from the SCC.

W [21:1] – A 21 single pins receptacle type connector for debugging purposes through the UART interface.

2.7 ECG/RSP Module Functional Description

2.7.1 Overview

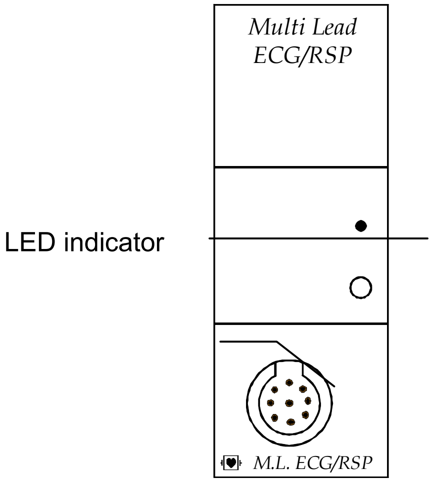


Figure 2-19. ECG/RSP Module – Front Panel

The multi-lead ECG/RSP module is the source of all ECG data in the ***Envoy*** bedside monitor. The ECG is measured using a multi-lead cable via electrodes attached to the patient's chest.

Monitoring the ECG produces a continuous waveform of cardiac electrical activity to enable an accurate assessment of a patient's current physiological condition. With the ECG module, you can use a 3, 5 or 6-lead electrode ECG cable set to display up to seven selectable ECG leads in up to three channels.

The Multi Lead ECG/RSP module is housed in the ***Envoy*** module rack, where it occupies a single slot. It includes ECG and respiration monitoring and O.R. filter.

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and blinking	QRS detected
LED is red and blinking	Passive lead fault
LED is red and on	"all fault" or "active lead fault" error detected

2.7.2 Block Diagram Description

The multi lead cable connected to patient's chest generates ECG signals. The ECG signals are fed to the Front-End block (FE) and to Respiration block (Resp). The FE block amplifies and filters these signals and the Resp block measures the changes in the patient's chest impedance according to the patient’s breaths.

The output of the FE block is fed to the following three blocks:

Pacer detector – The pacer signal is a spike generated by a heart pacer that corrupts the ECG waveform. The pacer detector generates a flag when a pacer signal is detected. This flag causes the update algorithm to ignore the ECG signal at that time frame.

Electorsurgery Filter - The Electrosurgery Filter (ESF) eliminates from either lead I, II or III the strong noise signal that may be present when the patient is undergoing electrosurgery. This is a 6 pole 12 Hz low pass filter with input lead software selectable.

A/D - The A/D converts the analog signals from the FE, ESF and RESP blocks to digital signals in serial format.

The serial digital output from the A/D is fed to the P&SB that performs the control, signal processing, communications interface and computation for the ECG board. Each time the P&SB receives a packet from the A/D, it separates the samples, stores them locally in its high speed memory, performs some special signal processing and, finally, wraps them in a suitable communications protocol and sends them to the module rack.

The isolation block electrically isolates the module from the module rack to provide safety for the patient and for the operator. The isolation limits the maximum current through the patient cable to a safe level.

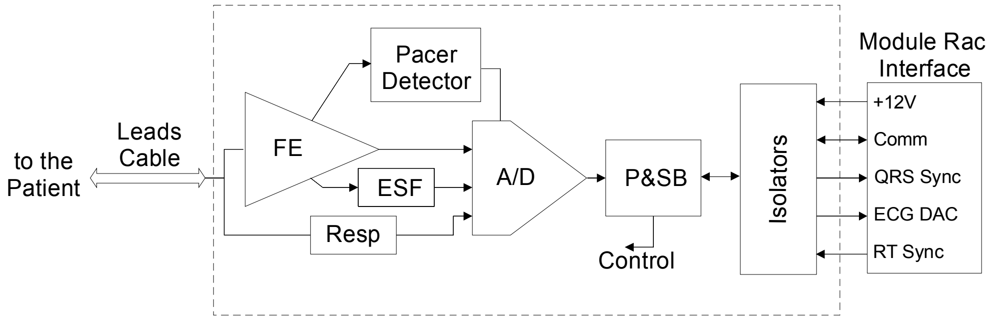


Figure 2-20. ECG/RSP Module - Block Diagram

2.7.3 Connectors Description

The ECG/RSP module includes the following connectors:

- ECG-J1 internal connector to the front panel console
- ECG-J2 internal connector to J1 of RESP sub-module (RESP-J1)
- ECG-J3 and ECG-J4 ground studs
- ECG-J5 connector to the module rack
- ECG-J7 internal connector to J1 of the P&SB sub-module (P&SB-J1)
- ECG-J11 internal connector to J2 of RESP sub-module (RESP-J2)

ECG-J1 internal connector to the front panel console

Pin	Description
1	Ground
2	Lead Fault (Red)
3	QRS (Green)
4	Switch

ECG-J2 internal connector to RESP-J1

Pin	Direction	Description
1	ECG → Respiration	ESU Filter Input
2	ECG ← Respiration	ESU Filter Output
3	ECG → Respiration	2.5V Reference
4	ECG → Respiration	Respiration Clock
5	ECG → Respiration	Channel Select
6	ECG → Respiration	Respiration Power Shutdown

ECG-J3 and ECG-J4 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

ECG-J3 provides reference for signals between ECG module and module rack, and ECG-J4 provide path for voltage transients to dissipate to earth (mains) ground.

ECG-J5 connector to the module rack

Pin #	Signal	Direction*	Description
1	GND		
2	GND		
3	GND		
4	MODULE PRESENT	Output	Module present notification signal. Notifies the module rack that this module is connected, by transmitting “0”.
5	QRS Sync	Output	The QRS Sync signal generated by the module provides the SpO2 module with an ECG-synchronized pulse for SpO2 measurements. This signal is active LOW.
6	n/c		
7	n/c		
8	pull-up		
9	ECG TX	Output	Output of the communication channel between the ECG module and the module rack. This signal is active LOW.
10	n/c		
11	+12V	Input	Power
12	+12V	Input	Power
13	+12V	Input	Power
14	+12V	Input	Power
15	DAC DATA	Output	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal. This signal is active LOW
16	DAC CLOCK	Output	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal. This signal is active LOW.
17	DAC SELECT	Output	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal. This signal is active LOW
18	REAL TIME CLOCK	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	n/c		
20	ECG RX	Input	Input of the communication channel between the module and the module rack. This signal is active LOW

* Direction related to the ECG module

ECG-J7 internal connector to P&SB-J1

ECG		P&SB	Pin	Pin	P&SB		ECG
P5V_DI	→	P5V_DI	30A	30B	P5V_DI	←	P5V_DI
P5V_DI	→	P5V_DI	29A	29B	P5V_DI	←	P5V_DI
P5V_DI	→	P5V_DI	28A	28B	P5V_DI	←	P5V_DI
reserved for 3.3V			27A	27B	~RTS1		
reserved for 3.3V			26A	26B	RCLK1		
reserved for 3.3V			25A	25B	TXD1	→	TXD_I
		Q15	24A	24B	~CD1		
BRG2	←	BRG2	23A	23B	TCLK1		
P12_DI	→	P12_AI	22A	22B	RXD1	←	RXD_I
		~IRQ1	21A	21B	Q14		
PACER_INTERRUPT	→	TIN1	20A	20B	PB9	←	~DRDY
		EXTAL	19A	19B	SPCLK	→	SPCLK_I
PCR_LD_SLCT0	←	Q9	18A	18B	~CTS1	←	RT_SYNC
PCR_LD_SLCT1	←	Q10	17A	17B	PA12	→	SEL_DAC
SLCT_FLT	←	Q12	16A	16B	PB5		
~RTS2 (~TFS)	←	~RTS2	15A	15B	PB11	←	~SWITCH
		PA8	14A	14B	Q7	→	RESET
MCLK/4	→	TCLK2	13A	13B	Q8	→	~RESET
SDATA	←	TXD2	12A	12B	SPTXD	→	SPTXD_I
EN_MUX	←	Q6	11A	11B	PB10	←	NOISE
RSP_CH_SLCT	←	Q5	10A	10B	Q13		
QRS_SYNC_I	←	Q4	9A	9B	RXD2	←	SDATA
LEAD_OK_G	←	Q3	8A	8B	Q11		
LEAD_FAULT_R	←	Q2	7A	7B	~CD2	←	~RFS
LD_SLCT1	←	Q1	6A	6B	TOUT2	→	RSP_CLK
LD_SLCT0	←	Q0	5A	5B	PB8	→	RSP_ON_LOW
GND_DI		GND_DI	4A	4B	GND_DI		GND_DI
GND_DI		GND_DI	3A	3B	GND_DI		GND_DI
GND_DI		GND_DI	2A	2B	GND_DI		GND_DI
MCLK/4	→	RCLK2	1A	1B	GND_DI		GND_DI

ECG-J11 internal connector to RESP-J2

Pin	Direction	Description
1	ECG → Respiration	Power, -5V
2	ECG → Respiration	Ground
3	ECG → Respiration	Power, +5V
4	ECG ← Respiration	Respiration Output to A/D

2.8 12 Lead ECG/Resp. Module Functional Description

2.8.1 Overview

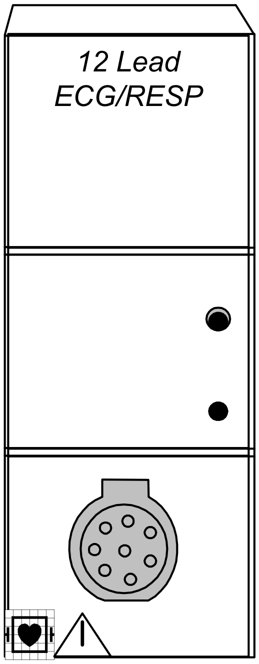


Figure 2-21: 12Lead ECG/RSP Module – Front Panel

The 12Lead ECG/RSP module, P/N C51-112-000, is the source of all ECG data in the *Envoy* bedside monitor. The complete Module sits in one of the slots in the *Envoy's* Module Rack and provides the Envoy with the capability of measuring up to 10 patient electrodes producing 12 vectors display on screen representing the patient electrocardiogram status. Three electrodes are being used for impedance pneumography (ie. respiration) representing patient breathing rate and signal quality.

The module interfaces with Mennen's 3, 5, 6 and 10-Lead standard ECG patient cables.

Reference document:

- Electrical schematic: C51-112-000

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and blinking	QRS detected
LED is red and blinking	Passive lead fault
LED is red and on	“all fault” or “active lead fault” error detected

Basic Block Diagram Description

The module integrates the following three major blocks: PBEAM, INTERFACE and P&SB.

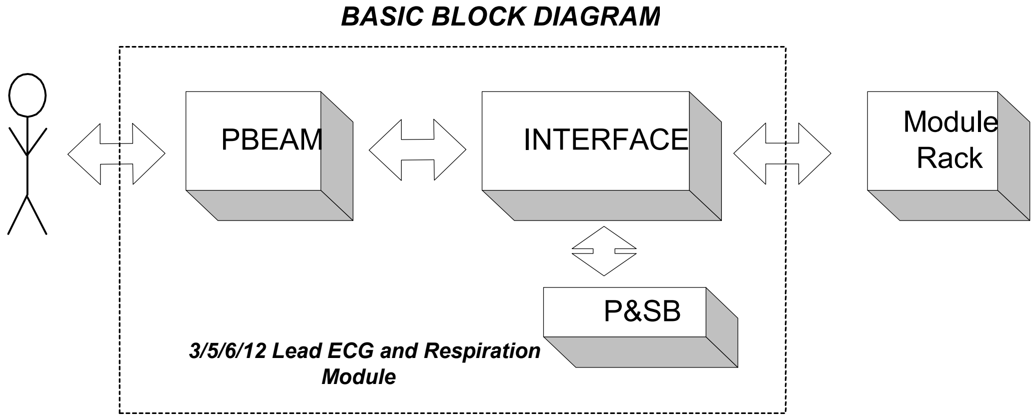


Figure 2-22:. 12Lead ECG/RSP Module - Block Diagram

PBEAM - Pryon based ECG Acquisition Module – an independent electronic unit provides the following: Patient front-end, multi-lead ECG and respiration data acquisition and pre-processing.

P&SB – Processing and Storage Block – an electronic unit for ECG and respiration post-processing.

INTERFACE BOARD – an electronic unit providing an isolation barrier and power supply system to both the PBEAM and P&SB blocks.

Connectors Description

The 12 Lead ECG/Resp. module includes the following connectors:

- INTERFACE - J1 internal connector to the front panel console
- INTERFACE - J8 and INTERFACE - J9 ground studs
- INTERFACE - J4 connector to the module rack

- INTERFACE - J5 Connector to P&SB - J1 sub module.
- INTERFACE - J2 Connector to PBEAM - J1 sub module.

INTERFACE –J1 internal connector to the front panel console

Pin	Description
1	Ground
2	Lead Fault (Red)
3	QRS (Green)
4	Switch

INTERFACE - J8, INTERFACE - J9 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is “live” - there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack.
Power is applied only when the module is "grounded".

ECG - J8 provides reference for signals between the ECG module and the module rack, and ECG - J9 provides a path for voltage transients to dissipate to earth (mains) ground.

INTERFACE-J4 connector to the module rack

Pin #	Signal	*Direction**	Description
1	GND		
2	GND		
3	GND		
4	MODULE PRESENT	Output	Module present notification signal. Notifies the module rack that this module is connected, by transmitting “0”.
5	QRS Sync	Output	The QRS Sync signal generated by the module provides the SpO2 module with an ECG-synchronized pulse for SpO2 measurements. This signal is active LOW.
6	n/c		
7	n/c		
8	pull-up		
9	ECG TX	Output	Output of the communication channel between the ECG module and the module rack. This signal is active LOW.
10	n/c		
11	+12V	Input	Power
12	+12V	Input	Power
13	+12V	Input	Power
14	+12V	Input	Power
15	DAC DATA	Output	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal. This signal is active LOW
16	DAC CLOCK	Output	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal. This signal is active LOW.
17	DAC SELECT	Output	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal. This signal is active LOW
18	REAL TIME CLOCK	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	n/c		
20	ECG RX	Input	Input of the communication channel between the module and the module rack. This signal is active LOW

- *Direction related to the ECG module*

P&SB Connector (INTERFACE-J5, P&SB-J1)

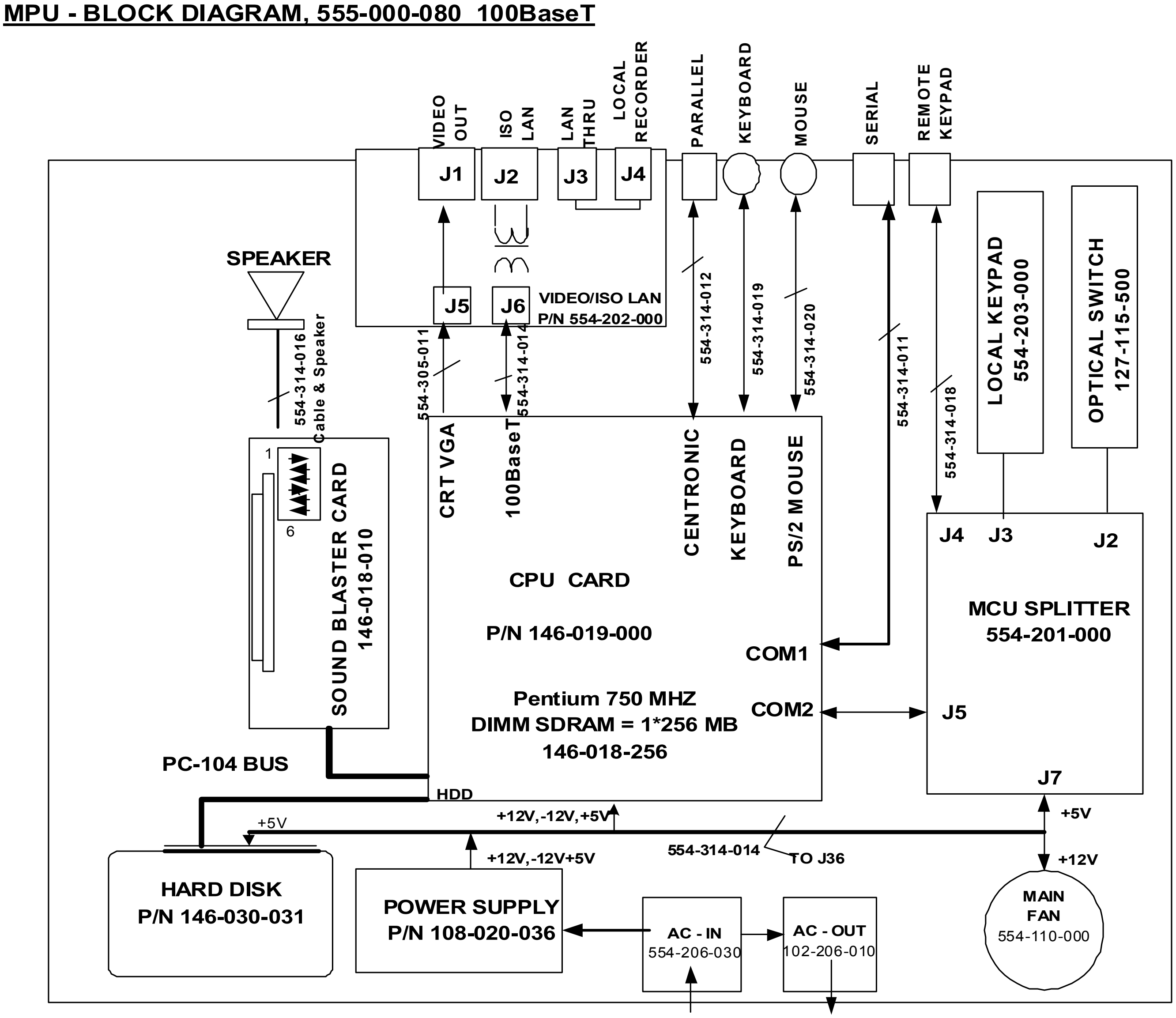
PBEAM		**P&SB**	**Pin**	**Pin**	**P&SB**		**PBEAM**
P5V_DI	→	P5V_DI	30A	30B	P5V_DI	←	P5V_DI
P5V_DI	→	P5V_DI	29A	29B	P5V_DI	←	P5V_DI
P5V_DI	→	P5V_DI	28A	28B	P5V_DI	←	P5V_DI
NC			27A	27B	~RTS1		NC
NC			26A	26B	RCLK1		NC
NC			25A	25B	TXD1	→	TXD_I
NC		*Q15*	24A	24B	~CD1		NC
NC		BRG2	23A	23B	TCLK1		NC
P5V_DI	→	P12	22A	22B	RXD1	←	RXD_I
NC		~IRQ1	21A	21B	Q14		NC
NC	→	TIN1	20A	20B	PB9		NC
NC		EXTAL	19A	19B	SPCLK	→	SPCLK_I
NC		Q9	18A	18B	~CTS1	←	RT_SYNC
NC		Q10	17A	17B	PA12	→	SEL_DAC
NC		Q12	16A	16B	PB5		NC
NC		~RTS2	15A	15B	PB11	←	~SWITCH
NC		PA8	14A	14B	Q7		NC
NC		TCLK2	13A	13B	Q8		NC
TXD2	←	TXD2	12A	12B	SPTXD	→	SPTXD_I
NC		Q6	11A	11B	PB10		NC
NC		Q5	10A	10B	Q13		NC
QRS_SYNC_I	←	Q4	9A	9B	RXD2	←	RXD2
LEAD_OK_G	←	Q3	8A	8B	Q11		NC
LEAD_FAULT_R	←	Q2	7A	7B	~CD2		NC
NC		Q1	6A	6B	TOUT2		NC
NC		Q0	5A	5B	PB8		NC
GND_DI		GND_DI	4A	4B	GND_DI		GND_DI
GND_DI		GND_DI	3A	3B	GND_DI		GND_DI
GND_DI		GND_DI	2A	2B	GND_DI		GND_DI
		RCLK2	1A	1B	GND_DI		GND_DI

INTERFACE-J2 Connector to PBEAM-J1 sub module.

Pin #	PBEAM	INTERFACE
1	P5V_D	P5V_DI
2	~RESET	~RESET
3	SDB_TXD	SDB_TXD
4	SDA_RXD	RXD2
5	SDB_RXD	SDB_RXD
6	SDA_RXD	SDA_RXD
7	GND_DI	GND_DI
8	GND_DI	GND_DI
9	~BDM_BKPT	~BDM_BKPT
10	~BDM_IFETCH	~BDM_IFETCH
11	BDM_FREEZE	BDM_FREEZE
12	BDM_IPIPE	BDM_IPIPE
13	N5V_A	N5V_AI
14	P5V_A	P5V_AI

Table 7: Interface to PBEAM connector (Interface-j2, PBEAM-j1)

Figure 2-23. Block Diagram of Ensemble MPU –100BaseT (P/N 555-000-080)


MPU - BLOCK DIAGRAM, 555-000-080 100BaseT
VIDEO OUT
ISO LAN
LAN THRU
LOCAL RECORDER
PARALLEL
KEYBOARD
MOUSE
SERIAL
REMOTE KEYPAD
J1
J2
J3
J4
SPEAKER
J5
J6
VIDEO/ISO LAN
P/N 554-202-000
554-314-016
Cable & Speaker
554-305-011
554-314-014
554-314-012
554-314-019
554-314-020
554-314-011
554-314-018
LOCAL KEYPAD
554-203-000
OPTICAL SWITCH
127-115-500
1
6
SOUND BLASTER CARD
146-018-010
CRT VGA
100BaseT
CENTRONIC
KEYBOARD
PS/2 MOUSE
CPU CARD
P/N 146-019-000
COM1
Pentium 750 MHZ
DIMM SDRAM = 1*256 MB
146-018-256
COM2
J4
J3
J2
MCU SPLITTER
554-201-000
J5
J7
PC-104 BUS
HDD
+12V,-12V,+5V
+5V
+5V
554-314-014
TO J36
+12V,-12V+5V
+12V
HARD DISK
P/N 146-030-031
POWER SUPPLY
P/N 108-020-036
AC - IN
554-206-030
AC - OUT
102-206-010
MAIN FAN
554-110-000

2.9 2BP & CO/2TMP Module Functional Description

2.9.1 Overview

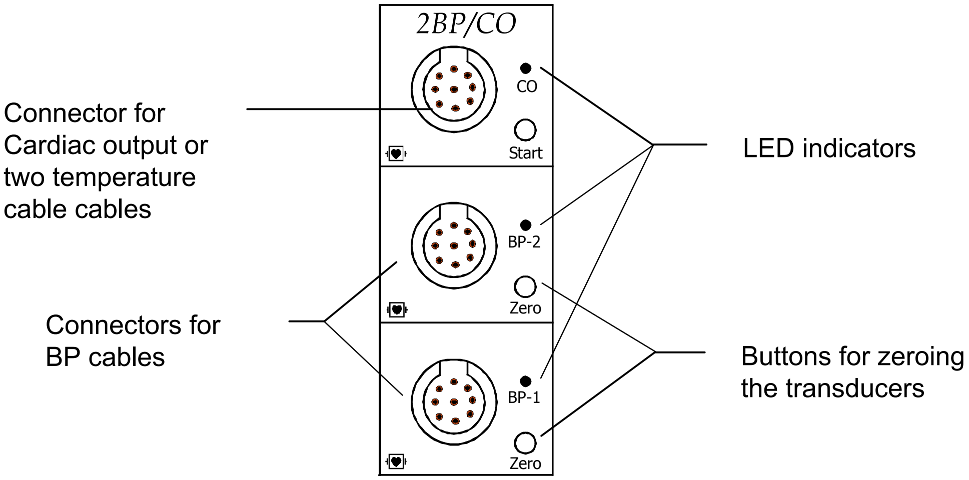

2BP/CO
CO
Start
BP-2
Zero
BP-1
Zero
Connector for Cardiac output or two temperature cable cables
Connectors for BP cables
LED indicators
Buttons for zeroing the transducers

Figure 2-24. 2BP & CO/2TMP Module – Front Panel

The Dual BP and CO/2TMP module is housed in the ***Envoy*** module rack, where it occupies a single slot. It supports two channels that enable it to simultaneously monitor two BPs as well as Cardiac Output or two body temperatures.

The 2BP & CO/2TMP single-size module is housed in the ***Envoy*** module rack, where it occupies one slot.

The LED indicators on the front panel of the module indicates the functional status of the channels as follows for:
SW V3.43 or higher for 2BP/CO

SW V1.13 and higher for 2BP.

Status	Indication
BP LED is off	BP Channel does not monitor
BP LED is red	BP Channel is monitored and not zeroed or cable is out.
BP LED is green and on	BP Channel is zeroed
CO/Temp. LED is off	CO or Temp. is not monitored
CO/Temp. LED is red	CO or Temp. is monitored, but no probe
CO/Temp. LED is green	CO or Temp. is monitored and probe is inserted

2.9.2 Block Diagram Description

Blood Pressure Principle of operation

Blood pressure usually is considered to be the pressure in the brachial arm artery at heart level. There is a maximum and minimum pressure that occurs in this artery due to the heart action. The maximum pressure, called *systolic pressure*, occurs at the completion of contraction of the heart. The minimum pressure, called *diastolic pressure*, occurs at the completion of the resting (repolarization) phase of the heart. *Pulse pressure* is the difference between systolic and diastolic pressures. As one of the physiological variables that can be quite readily measured, blood pressure is considered a good indicator of the status of the cardiovascular system.

The indirect (noninvasive) method of blood pressure measurement has certain disadvantages in that it does not provide a continuous recording of pressure variations and its practical repetition rate is limited. Furthermore, only systolic and diastolic arterial pressure readings can be obtained, with no indication of the details of pressure waveform. The indirect method is also somewhat subjective and often fails when the blood pressure is very low (as would be the case when a patient is in shock).

Direct (invasive) blood pressure measurement, on the other hand, do provide a continuous readout of the blood pressure waveform and are considerably more accurate than the indirect method. They require, however, that a blood vessel be punctured in order to introduce the sensor.

Blood pressure is measured via a fluid-filled catheter and dome pressure transducer. The active element of a typical transducer consists of a thin membrane and resistive element, which changes in resistance as the membrane deflects with pressure. Impressing a fixed voltage across the resistive element derives the blood pressure signal. The amount of current that flows through the variable resistance element, once sealed, is considered the blood pressure signal.

The blood pressure signal than pass through a low pass filter to cut noise signals, than to the analog to digital converter (ADC). The ADC serial data output pass to the P&SB for further processing and data storage (for more details about the P&SB, see Section 3.4 P&SB Module Functional Description).

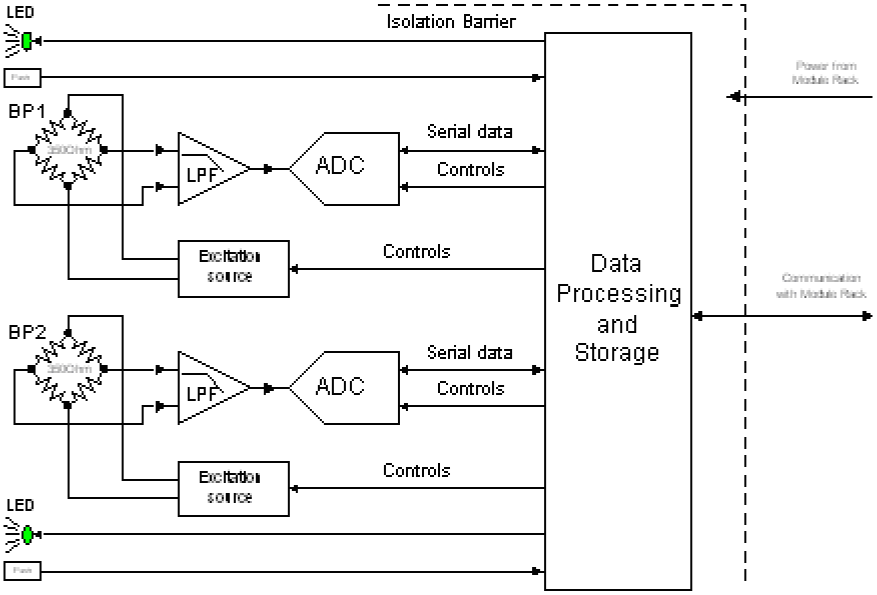

LED
Isolation Barrier
Power from Module Rack
BP1
350Ohm
LPF
ADC
Serial data
Controls
Excitation source
Controls
Data Processing and Storage
Communication with Module Rack
BP2
350Ohm
LPF
ADC
Serial data
Controls
Excitation source
Controls
LED

Figure 2-25. 2BP Module – Signal Flow

Cardiac Output Principle of operation

Cardiac output is perhaps the most important parameter of the entire circulatory system because it determines the blood flow to all issues of the body. Diseases of the heart can result in a decrease of cardiac output leading to an inadequate nutrition of the cells of the body.

Cardiac output may be expressed as the product of heart rate and volume of blood pumped per beat of the heart, assuming a consistent stroke volume:

Cardiac Output = (Heart Rate) (Stroke Volume)

$$\frac{Liters}{Min} = \left[\frac{Beats}{Min}\right]\left[\frac{Liters}{Beat}\right]$$

Cardiac output or blood flow is directly proportional to mean blood pressure and inversely proportional to peripheral resistance.

Cardiac Output by Thermodilution

An exact amount of a solution of known temperature is injected into the right atrium or superior vena cava and the resultant change in blood temperature is detected by the thermistor in the pulmonary artery. Cardiac output is inversely proportional to the integral temperature change.

The following equation is used to compute cardiac output by the thermodilution method:

$$C.O. = \frac{(1.08)(Ct)(60)Vi(Tb - Ti)}{\int_0^\infty \Delta Tb(t)dt}$$

Where:
C.O. = Cardiac Output (ml/min)
1.08 = Correlation constant
Ct = Correction for injectate temperature rise (from the table)
60 = Seconds/minute
Vi = Volume of injectate
Tb = Initial blood temperature (°C)
Ti = Initial injectate temperature (°C)

The ADC converts the analog signals from the CO catheter and the injection bath to digital signals. The ADC serial data output pass to the P&SB for further processing and data storage (for more details about the P&SB, see section 3.4 P&SB Module Functional Description).

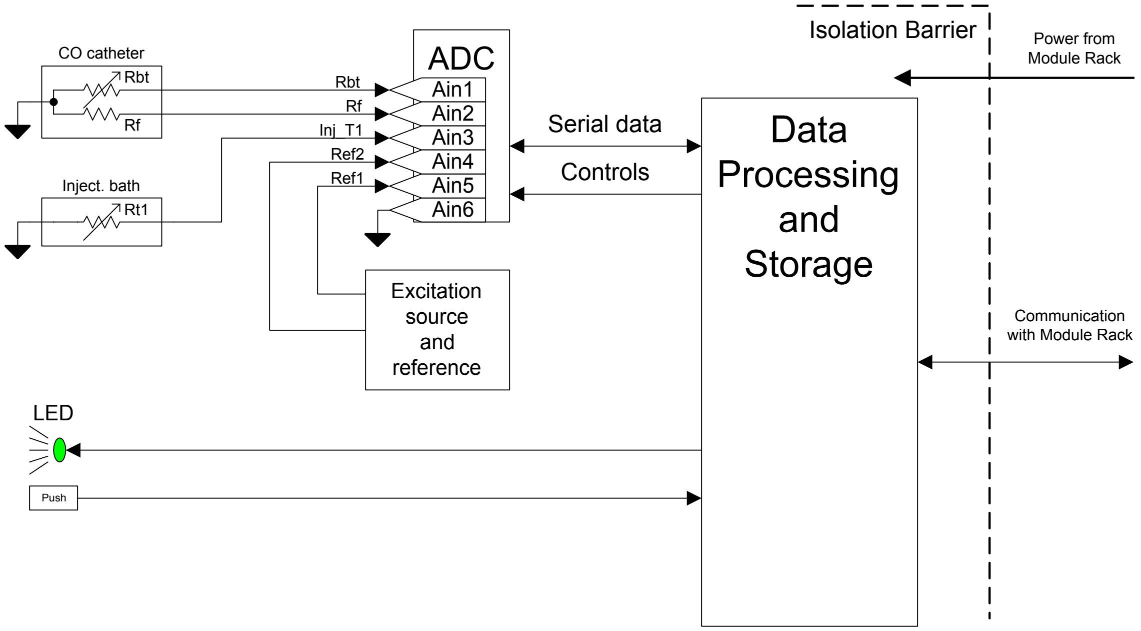

CO catheter
Rbt
Rf
Inject. bath
Rt1
Rbt
Rf
Inj_T1
Ref2
Ref1
ADC
Ain1
Ain2
Ain3
Ain4
Ain5
Ain6
Excitation source and reference
Serial data
Controls
Data Processing and Storage
Isolation Barrier
Power from Module Rack
Communication with Module Rack
LED
Push

Figure 2-26. Cardiac Output (CO) - Signal Flow

2.9.3 Connectors Description

The 2BP & CO/2TMP module includes the following connectors:

- BP1 and BP2 internal connectors to the front panel console
- BP1 and BP2 flex circuit on the front panel console
- CO internal connector to the front panel console
- CO flex circuit on the front panel console
- J9 and J10 ground studs
- J6 connector to the module rack
- Internal connector to the P&SB sub-module (P&SB)

BP1 and BP2 internal connectors to the front panel console

Front panel connector pin #	Wire color	PCB pin #	Signal name
1	Red	1	~BP**X**_CON_IN
2	Blue	2	BP**X**
3	Black	3	BP**X**_RET
4	White	4	N/C
5	Green	5	BP**X**_EXC
6	Brown	6	AGND_I
7	Gray	7	CGND_I
8	Yellow	8	CGND_I

X represents BP1 or BP2

BP1 and BP2 flex circuit on the front panel console

Pin #	Signal name	Direction	Function
1	CGND_I	-	Ground
2	~SW**X**	input	Push button
3	LED**X**_R	output	Red LED
4	LED**X**_G	output	Green LED

X represents BP1 or BP2

CO internal connector to the front panel console

Front panel connector pin #	Wire color	PCB pin #	Signal name	2 Temp cable adapter
1	Red	1	~CO_CON_IN	~CO_CON_IN
2	Blue	2	AGND_I	AGND_I
3	Black	3	INJ_T1	Shorted to AGND_I
4	White	4	AGND_I	AGND_I
5	Green	5	N/C	N/C
6	Brown	6	RF	Temp 2
7	Gray	7	RBT	Temp 1
8	Yellow	8	CGND_I	CGND_I

Figure 2.28 shows connections required to measure two temperatures (YSI400 series probes) with 2IBP/CO module.

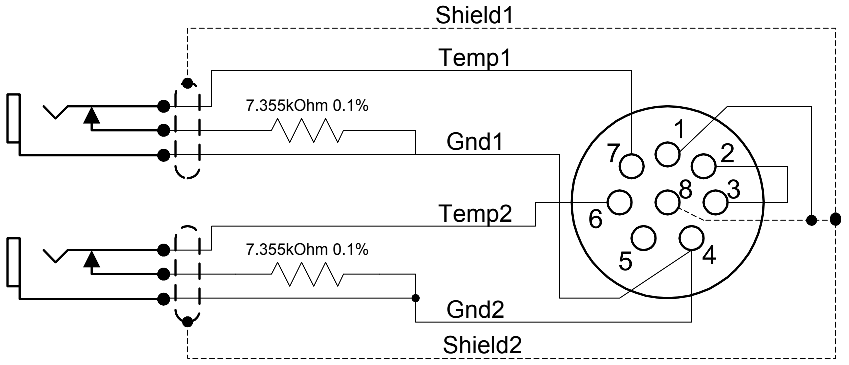


Figure 2.27: 2Temp Cable Adapter

The two resistors are 7.355kOhm 0.1% with TCR (temperature coefficient of resistance) 100±ppm/°C. Connectors are 1/4" phone-jacks (single closed circuit).

CO flex circuit on the front panel console

Pin #	Signal name	Direction	Function
1	CGND_I	-	Ground
2	~SW3	input	Push button
3	LED3_R	output	Red LED
4	LED3_G	output	Green LED

J9 and J10 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J10 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J9 connects to the GND of module rack to provide reference for signals between the module and module rack

J6 connector to the module rack

Pin #	2BP/CO	Direction	Module Rack
1	GND		GND
2	GND		GND
3	GND		GND
4	GND	⇨	MPRES
5	~QRS_SYNC_NI	⇦	QRS_Sync
6	N/C	⇦	Out_Dat_DAC
7	N/C	⇦	Out_Clk_DAC
8	TXD_NI	⇨	Rx
9	N/C	⇨	ECG_Rx
10	RXD_NI	⇦	Tx
11	P12V		+12VDC
12	P12V		+12VDC
13	P12V		+12VDC
14	P12V		+12VDC
15	DO_DAC_NI	⇨	In_Dat_DAC
16	CLK_DAC_NI	⇨	In_Clk_DAC
17	~CS_DAC_NI	⇨	In_Sel_DAC
18	RTCLK_NI	⇦	RTClk
19	N/C	⇦	Out_Sel_DAC
20	N/C	⇦	ECG_Tx

Internal connector to the P&SB sub-module (P&SB)

2BP/CO		Pin #		P&SB	P&SB		Pin #		2BP/CO
P5V_DI		30A		P5V_DI	P5V_DI		30B		P5V_DI
P5V_DI		29A		P5V_DI	P5V_DI		29B		P5V_DI
P5V_DI		28A		P5V_DI	P5V_DI		28B		P5V_DI
reserved for 3.3V		27A			~RTS1	⇨	27B		
reserved for 3.3V		26A			RCLK1	⇦	26B		
reserved for 3.3V		25A			TXD1	⇨	25B	⇨	TXD_I
		24A	⇦	Q15	~CD1	⇦	24B		
BRG2	⇦	23A	⇦	BRG2	TCLK1	⇦	23B		
P12_AI	⇨	22A	⇨	P12_AI	RXD1	⇦	22B	⇦	RXD_I
~QRS_SYNC_I	⇨	21A	⇨	~IRQ1	Q14	⇨	21B	⇨	~SBY_BP1
~BP1_CON_IN	⇨	20A	⇨	PB3	PB9	⇦	20B	⇦	~DRDY_BP2
		19A	⇨	EXTAL	SPCLK	⇨	19B	⇨	SCLK
~SLEEP1	⇦	18A	⇦	Q9	~CTS1	⇦	18B	⇦	RTCLK_I
		17A	⇦	Q10	PA12	⇨	17B	⇨	~CS_DAC_I
		16A	⇦	Q12	PB5	⇦	16B	⇦	~PB2_CON_IN
~CS_CO	⇦	15A	⇦	PA5	PB11	⇦	15B	⇦	~DRDY_BP1
DOUT	⇨	14A	⇨	PA8	Q7	⇨	14B	⇨	~SYNC
~CS_BP2	⇦	13A	⇦	PA3	Q8	⇨	13B	⇨	~RESET
~CS_BP1	⇦	12A	⇦	PA1	SPTXD	⇨	12B	⇨	DIN
~SLEEP2	⇦	11A	⇦	Q6	PB10	⇦	11B	⇦	~DRDY_CO
LED1_R	⇦	10A	⇦	Q5	Q13	⇨	10B	⇨	~SBY_CO
LED1_G	⇦	9A	⇦	Q4	PA0	⇦	9B	⇦	~CO_CON_IN
LED2_R	⇦	8A	⇦	Q3	Q11	⇨	8B	⇨	~SBY_BP2
LED2_G	⇦	7A	⇦	Q2	PA6	⇦	7B	⇦	~SWITCH1
LED3_R	⇦	6A	⇦	Q1	PB6	⇦	6B	⇦	~SWITCH2
LED3_G	⇦	5A	⇦	Q0	PB8	⇦	5B	⇦	~SWITCH3
GND_DI		4A		GND_DI	GND_DI		4B		GND_DI
GND_DI		3A		GND_DI	GND_DI		3B		GND_DI
GND_DI		2A		GND_DI	GND_DI		2B		GND_DI
		1A	⇨	PA2	GND_DI		1B		GND_DI

2.10 NIBP Module Functional Description

2.10.1 Overview

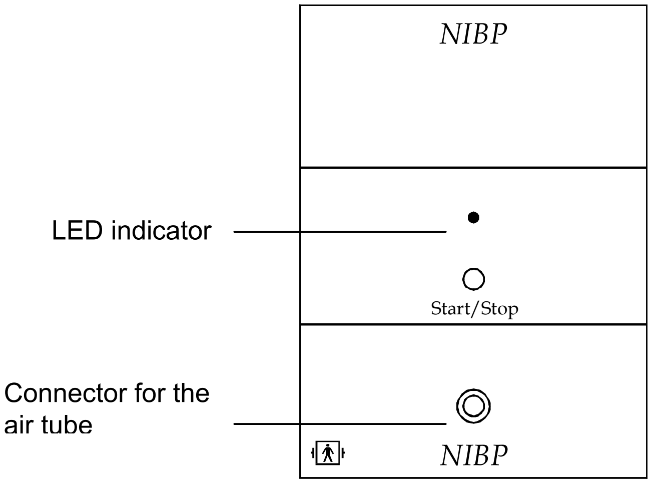


Figure 2-28. NIBP Module – Front Panel

The NIBP module measures the Non-Invasive blood pressure. Pressure is measured using a cuff and is derived by the oscillometric method. The cuff is automatically inflated and systolic, diastolic and mean pressures are derived as the cuff deflates. Adults and neonates may be monitored.

The ***Envoy*** bedside monitor can be configured to take NIBP readings in one of three modes: manual, automatic and stat mode.

- In the manual mode, a single NIBP measurement is taken as required.
- In the automatic mode, measurements are repeated at regular, pre-set intervals.
- In the stat mode, blood pressure is measured as many times as possible during a period of five minutes.

Readings can be logged in the patient’s chart.

The NIBP dual-size module is housed in the ***Envoy*** module rack, where it occupies two slots.

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and on	Module is idle
LED is red and blinking	Module is determining blood pressure
LED is red and on	Measurement or technical failure detected

2.10.2 Block Diagram Description

The NIBP module consists of an OEM CAS NIBP module, an interface circuit and P&SB circuit. The CAS module includes a microprocessor that controls the inflation of the cuff, wrapped around the patient's arm, which enables blood pressure measurements. The CAS module provides the data to the P&SB circuit through the NIBP interface (see *Figure 2-34*).

The communication between the CAS module and the P&SB circuit has the following characteristics:

Speed:	9600 bps
Physical layer:	TTL levels
Data Link layer:	Serial, full duplex, asynchronous (derivative of RS-232). Start bit, 8 data bits, 1 parity bit (even), 1 stop bit. No handshake signals.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see Section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed:	up to 19200 bps
Physical layer:	TTL/CMOS levels
Data Link layer:	Serial, full duplex, asynchronous point-to-point link.

The interface circuit consists of the following:

- A 12 V to 8 V voltage regulator that regulates the input voltage from the module rack for the P&SB circuit and the flex keypad & LED.
- Three connectors to connect the CAS module, P&SB and the module rack.
- Flex keypad & LED that is connected to the I/O port of the P&SB circuit.

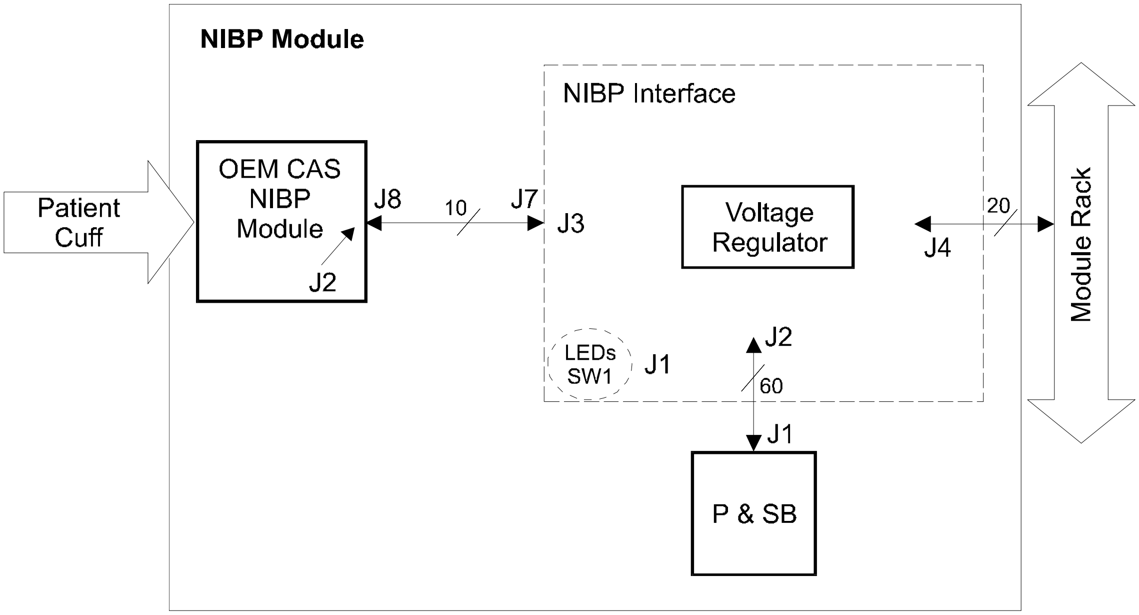

NIBP Module
NIBP Interface
Patient Cuff
OEM CAS NIBP Module
J2
J8
10
J7
J3
Voltage Regulator
J4
20
Module Rack
LEDs SW1
J1
J2
60
J1
P & SB

Figure 2-29. NIBP Module - Block Diagram

2.10.3 Connectors Description

The NIBP Module includes the following connectors:

- J1 optional connector to the flex keypad and LED
- J2 connector to the P&SB circuit (internal connector)
- J3 connector to OEM CAS NIBP module
- J4 connector to the module rack
- J5 and J6 ground studs

J1 optional connector to the flex keypad and LED

PIN	Signal	Direction	Description
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

J2 connector to the P&SB circuit (internal connector)

NIBP		PIN		P&SB	P&SB		PIN		NIBP
-		1A		PA2	GND-DI	⇒	1B	⇒	GND
GND	⇐	2A	⇐	GND-DI	GND-DI	⇒	2B	⇒	GND
GND	⇐	3A	⇐	GND-DI	GND-DI	⇒	3B	⇒	GND
GND	⇐	4A	⇐	GND-DI	GND-DI	⇒	4B	⇒	GND
-		5A		Q0	PB8		5B		-
-		6A		Q1	TOUT2		6B		-
-		7A		Q2	PA6	⇔	7B	⇐	~SWITCH1
-		8A		Q3	Q11		8B		-
LED1-G	⇐	9A	⇐	Q4	PA0	⇔	9B	⇐	RXD2
LED1-R	⇐	10A	⇐	Q5	Q13		10B		-
-		11A		Q6	PB10		11B		-
TXD2	⇐	12A	⇔	PA1	PA9		12B		-
-		13A		PA3	Q8		13B		-
-		14A		PA8	Q7	⇒	14B	⇒	RESET
-		15A		PA5	PB11		15B		
-		16A		Q12	PB5		16B		-
-		17A		Q10	PA12		17B		-
-		18A		Q9	~CTS1	⇐	18B	⇐	RTCLK1
-		19A		EXTAL	PA10		19B		-
-		20A		PB3	PB9		20B		-
-		21A		~IRQ1	Q14		21B		-
P12V	⇒	22A	⇒	P12-AI	RXD1	⇐	22B	⇐	RXD-I
-		23A		PA7	TCLK1		23B		-
-		24A		Q15	~CD1		24B		-
-		25A		-	TXD1	⇒	25B	⇒	TXD-I

NIBP		PIN		P&SB	P&SB		PIN		NIBP
-		26A		-	RCLK1		26B		-
-		27A		-	~RTS1		27B		-
P5V	⇒	28A	⇒	P5V-DI	P5V-DI	⇐	28B	⇐	P5V
P5V	⇒	29A	⇒	P5V-DI	P5V-DI	⇐	29B	⇐	P5V
P5V	⇒	30A	⇒	P5V-DI	P5V-DI	⇐	30B	⇐	P5V

J3 connector to OEM CAS NIBP module

CAS		PIN		NIBP Interface	Description
P6V	⇐	1	⇐	P6V	Power
P6V	⇐	2	⇐	P6V	Power
P6V	⇐	3	⇐	P6V	Power
GND	⇒	4	⇒	GND	Power
GND	⇒	5	⇒	GND	Power
GND	⇒	6	⇒	GND	Power
KEY		7		NC	-
EXT. Reset	⇐	8	⇐	RESET	External Reset to CAS Module
RxD	⇐	9	⇐	TXD2	Transmits data
TxD	⇒	10	⇒	RXD2	Receives data

J4 connector to the module rack

PIN	Signal	Direction*	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Notifies module rack that this module is connected, by transmitting CMOS logic “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.

PIN	Signal	Direction*	Description
6	NC	-	Input data signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from Module Rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between NIBP module & module rack (speed up to115.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between NIBP module & module rack (speed up to115.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power
15	NC	-	Output data of serial communication channel from NIBP module to DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from NIBP module to DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from NIBP module to DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

* Direction related to NIBP interface

J5 and J6 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J6 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground; then J5 connects to the GND of module rack to provide reference for signals between the module and module rack.

2.11 NIBP Module (551-132-000-Single Slot)

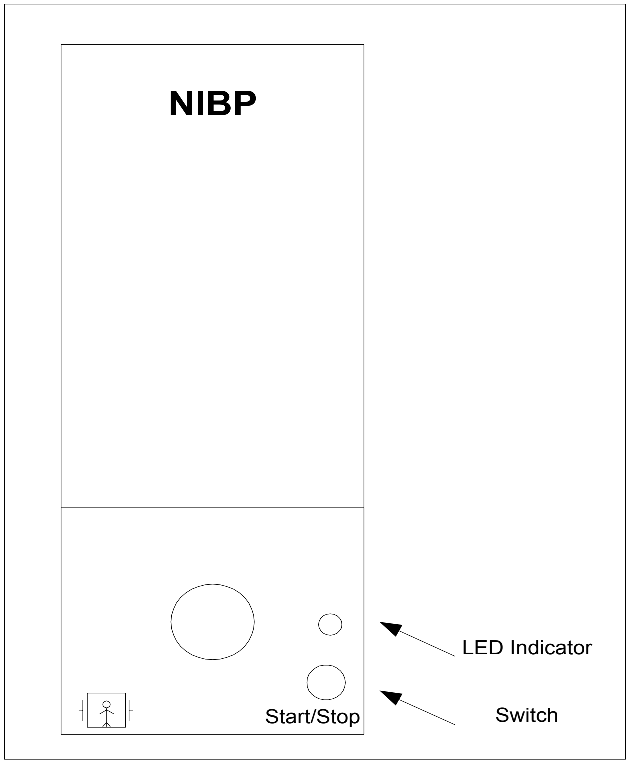


Figure 2-30: Front Panel of the NIBP Module (single slot)

2.11.1 Overview

Non-Invasive blood pressure is detected in the NIBP module. Pressure is measured using a cuff and is derived by the oscillometric method. The cuff is automatically inflated and systolic, diastolic and mean pressures are derived as the cuff deflates. Adults and neonates may be monitored. The *Envoy* bedside monitor can be configured to take NIBP readings in one of three modes: manual, automatic and stat mode.

- In the manual mode, a single NIBP measurement is taken as required.
- In the automatic mode, measurements are repeated at regular, pre-set intervals.
- In the stat mode, blood pressure is measured as many times as possible during a period of five minutes.

Readings can be logged in the patient's chart.

Note: During NIBP operation, isolated readings may be displayed which indicate a significant change in blood pressure values. This may have been caused by a change in the patient's actual pressure or by a movement artifact, muscle *tremors, or a weak pulse. Take a manual ausculatory blood pressure to verify the patient's pressure before administering any medication.*

Note: The width of the cuff should be 50% of the limb circumference or 2/3 of the upper arm length. The inflation part of the cuff should be long enough to encircle 50-80% of the limb.

Note: Inflation pressures used in adult NIBP monitoring are not appropriate for neonates. Also, neither the pediatric nor the adult cuff is suitable for neonates.

Limitations of the Oscillometric Method

The patient's actual condition at the time of measurement has a direct bearing on the reliability of that measurement. When taking an NIBP measurement, a regular arterial pressure pulse is sought. When a patient's condition makes that pulse hard to detect, it may take longer to get a reading and the reading may be unreliable. In some cases, the patient's condition may make it impossible to take a reading.

The following conditions may interfere with the oscillometric method:

- Heart-Lung Machine - It is impossible to take an NIBP reading when a patient is connected to a heart-lung machine.

- Arrhythmia - An irregular heartbeat caused by cardiac arrhythmia may cause the NIBP reading to be unreliable or impossible to perform. Again, measurement time is increased.

- Changes in Pressure - If a patient's blood pressure changes rapidly over the period of time during which the arterial pressure pulses are being analyzed for the reading, the measurement will be unreliable and may be impossible to obtain.

- Patient Movement - Patient movement, shivering, tremors, and convulsions may interfere with detection of partial pressure pulses. NIBP measurements may be unreliable or impossible to perform. In any case, measurement time is increased.

- Heart Rate Extremes - An NIBP reading cannot be taken if the patient's heart rate is less than 40 BPM or more than 300 BPM.

- Severe Shock - Reduced blood flow to the extremities due to shock or hypothyroid causes reduced pulsations of the arteries. This causes the NIBP readings taken under such conditions to be unreliable.

- Limitations for Neonates - Due to the small size of arteries in premature babies and in neonates, it becomes more difficult to sense the arterial pulse. To achieve optimal results in Neonatal NIBP:

1. Use the shortest practical tube length possible between the NIBP module and the Cuff. Use approximately 1.5 meters as a practical compromise.

2. Do not tighten the Cuff on the baby's limb. Leave a space of approximately 5 mm between the Cuff and the limb.

Preparatory Checklist

- Make sure that the NIBP module is inserted in the module rack, and that NIBP monitoring is activated.

- Select the correct cuff size for the patient. Cuff width should be either 40% of the arm's circumference or 2/3 the upper arm length. If you are unsure whether the cuff is large enough, use a larger cuff.

- Connect the fitting at the end of the pressure hose to the corresponding fitting on the cuff and the monitor.

- Ensure that the cuff is not open and that fittings are tight to prevent air leaks. No reading can be obtained when cuff is open.

Note: 1. An incorrect cuff size, especially a normal cuff on obese patients, may result in incorrect readings.

2. Always take care to avoid compression or restriction of pressure tubes.

Warnings

- Do not perform NIBP measurements on patients with sickle-cell anemia or any condition involving skin damage.

- Do not apply the cuff to a limb where an intravenous infusion or catheter is inserted. The infusion is slowed or blocked during cuff inflation, and tissue damage may result around the catheter.

- Due to the risk of hematoma in the limb where the cuff is placed, use clinical judgment when deciding whether or not to perform automatic blood pressure readings on patients with severe blood clotting disorders.

- It is important when measuring blood pressure in neonatal patients, to make sure that the *Envoy* is correctly configured for neonatal readings, due to the lower overpressure level used.

Leakage Test

The Leakage test procedure is described in Chapter 5 – System Setup of the Service Manual.

Warning

***Never perform a leakage test when the cuff is attached to a patient*.**

The NIBP single-size module is housed in the ***Envoy*** module rack, where it occupies one slots.

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and on	Module is idle
LED is red and blinking	Module is determining blood pressure
LED is red and on	Measurement or technical failure detected

2.11.2 Block Diagram Description

The NIBP module consists of an OEM CAS NIBP ND module, an interface circuit which includes P&SB circuits. The CAS module includes a microprocessor that controls the inflation of the cuff, wrapped around the patient's arm, which enables blood pressure measurements. The CAS module provides the data to the P&SB circuit through the NIBP interface (see *Figure 2-34*).

The communication between the CAS module and the P&SB circuit has the following characteristics:

Speed:	1200 bps
Physical layer:	TTL levels
Data Link layer:	Serial, full duplex, asynchronous (derivative of RS-232). Start bit, 8 data bits, 1 parity bit (even), 1 stop bit. No handshake signals.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see Section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed:	up to 19200 bps
Physical layer:	TTL/CMOS levels
Data Link layer:	Serial, full duplex, asynchronous point-to-point link.

The interface circuit consists of the following:

- 12 V DC which supply from the MR.
- 5 V DC for the digital circuits which supply from switch regulator.
- Two connectors to connect the CAS ND module and the module rack.
- Flex keypad & LED that is connected to the I/O port of the P&SB circuit.

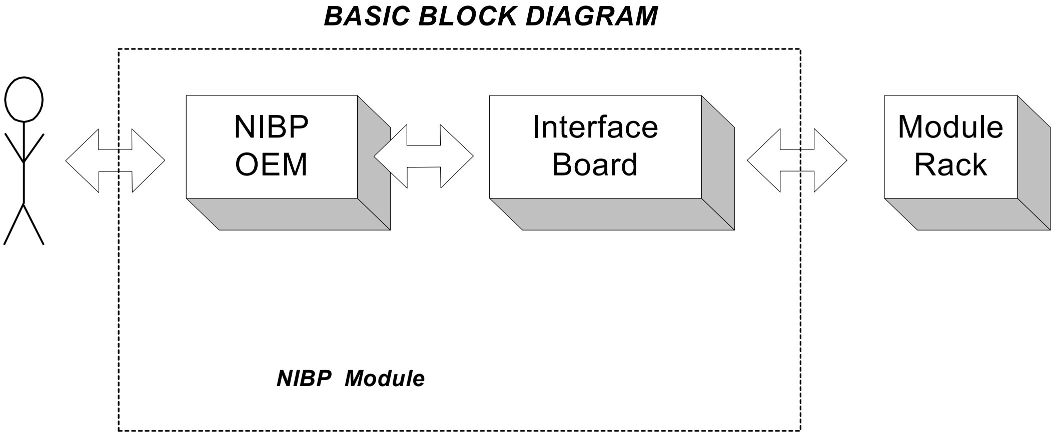


Figure 2-31. NIBP Module - Block Diagram

- The CAS ND OEM
- Mennen interface board which include the P&SB design.

2.11.3 Connectors Description

The EtCO2 Module includes the following connectors:

- J9 & J10 – GND connectors
- J6 – Connector to module rack.
- J3 – Connector to OEM.
- J2- Flex Connector.
- J1 – BDM Connector

J9 and J10 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J2 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack

J6 connector to the module rack

PIN	Signal *	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Module present notification signal. Notifies the module rack that this module is connected, by transmitting “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).

PIN	Signal *	Direction	Description
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power

PIN	Signal *	Direction	Description
15	NC	-	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

- Direction related to EtCO2 interface

J3 – OEM Connector:

PIN	Signal *	Direction	Description
1	12 VDC		
2	12 VDC		
3	NC		
4	NC		
5	GND		
6	GND		
7	NC		
8	Reset	In	Reset signal to OEM
9	NIBP RXD	Out	Transmit line from the OEM to the interface board.
10	NIBP TXD	In	Receive line from the OEM.

J2 optional connector to the flex keypad and LED

PIN	Signal	Direction	Description
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

2.12 SPO$_2$ Module (Nellcor): Functional Description

2.12.1 Overview

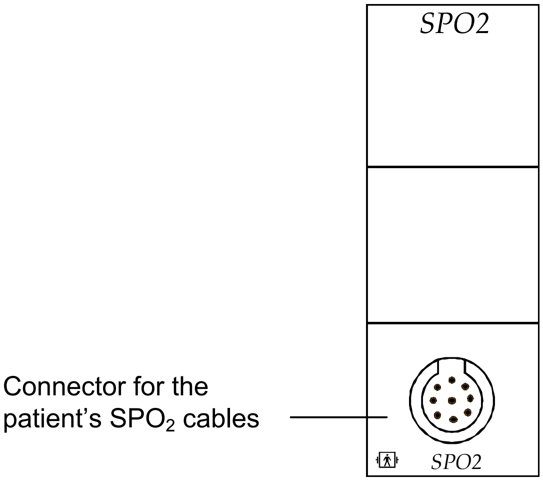


Figure 2-32. SPO$_2$ Module – Front Panel

The SPO$_2$ module measures the patient's arterial oxygen saturation and pulse rate. Arterial oxygen saturation is the percentage of oxygenated hemoglobin in relation to the total hemoglobin. For example, if 95 percent of the hemoglobin molecules in the arterial red blood cells combine with oxygen, the blood has an oxygen saturation of 95 percent. The Sp02 numeric value represents the percentage of hemoglobin molecules that have combined with oxygen molecules to form oxyhemoglobin.

The SPO$_2$ module measures oxygen saturation using the Pulse Oximetry method. This continuous, non-invasive method measures the light absorption in the patient's tissue (for example, using a finger probe) to a receiver on the other side.

Absorption by tissue and venous blood is constant. However, the blood flow in the arterioles is pulsate and, therefore, varies with time. Measuring light absorption during pulsation can derive oxygen saturation of the arterial blood.

The ***Envoy*** provides continuous monitoring of arterial oxygen saturation expressed as a percentage. Moment-to-moment variations in capillary filling are presented as a continuous pulse waveform. The pulse rate is derived from the pulse waveform.

The SPO$_2$ single-size module with Nellcor OEM technology is housed in the ***Envoy*** module rack, where it occupies one slot.

2.12.2 Block Diagram Description

The SPO_2 module consists of an OEM Pulse Oximetery module, an interface circuit and P&SB circuit. The OEM Pulse Oximetery module is a third party sub-module (Nellcor model MP204P) which performs the actual SpO2 functions. The OEM Pulse Oximetery module provides the data to the P&SB circuit through the SPO_2 interface (see *Figure 2-36*).

The communication between the SPO_2 module and the P&SB circuit has the following characteristics:

Speed: 9600 bps

Physical layer: TTL levels

Data Link layer: Serial, full duplex, asynchronous (derivative of RS-232).
Start bit, 8 data bits, 1 parity bit (even), 1 stop bit.
No handshake signals.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see Section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed: up to 19200 bps

Physical layer: TTL/CMOS levels

Data Link layer: Serial, full duplex, asynchronous point-to-point link.

The interface circuit consists of the following:

- A 12 V to 5 V voltage regulator (located in the isolated part) that regulates the input voltage from the module rack for the P&SB circuit, OEM Pulse Oximetery module and the flex keypad & LED.
- A 12 V to 5 V voltage regulator (located in the non-isolated part) that regulates the input voltage from the module rack for the non-isolated circuits.
- A +12 V to –12 V inverter for the OEM Pulse Oximetery module.
- Isolation circuit that provides electrical isolation between the module rack and the patient. The isolation circuit consists of opto-couplers and DC voltage couplers for the 12 V input from the module rack.
- Three connectors to connect the OEM Pulse Oximetery module, P&SB and the module rack.

- Flex keypad & LED that is connected to the I/O port of the P&SB circuit.

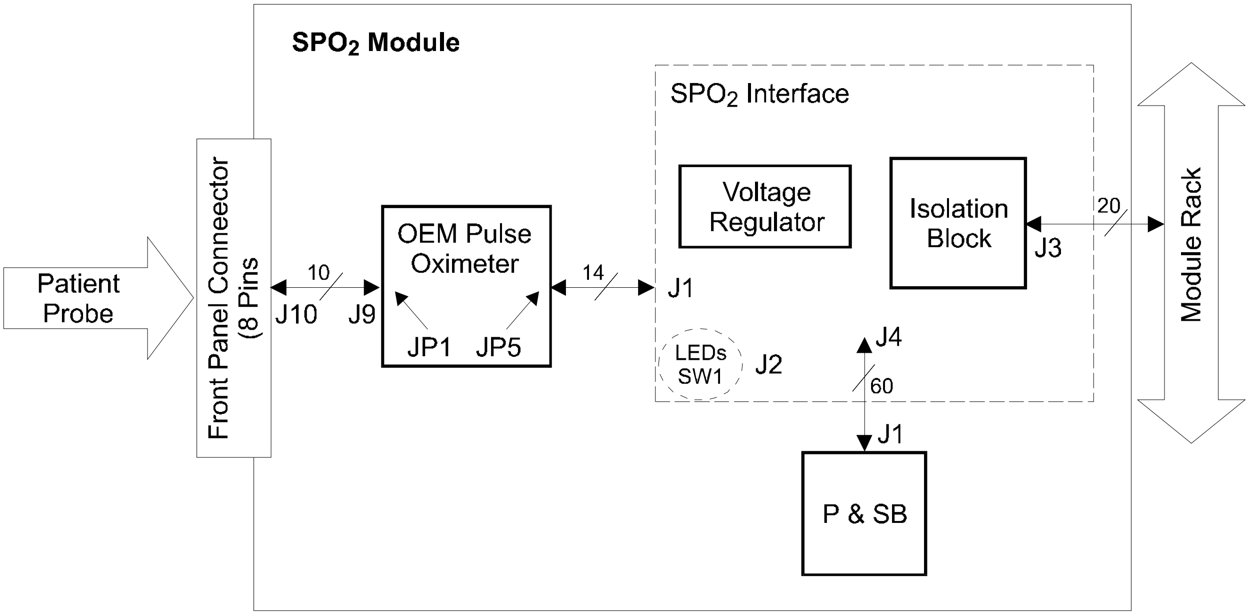

SPO2 Module
SPO2 Interface
Patient Probe
Front Panel Conneector (8 Pins
10
J10
J9
OEM Pulse Oximeter
JP1
JP5
14
J1
Voltage Regulator
Isolation Block
J3
20
Module Rack
LEDs SW1
J2
J4
60
J1
P & SB

Figure 2-33. SPO₂ Module - Block Diagram

2.12.3 Connectors Description

The SPO$_2$ Module includes the following connectors:

- J1 connector to JP5 on OEM Pulse Oximetery module
- J2 optional connector to the flex keypad and LED (not installed)
- J3 connector to the module rack
- J4 connector to the P&SB circuit (internal connector)
- J5 and J6 ground studs
- JP1 OEM sensor interface connector
- J10 front panel connector

-

J1 connector to JP5 on OEM Pulse Oximetery module

JP5 on OEM PO		PIN		SPO2 Interface	Direction	Description
VCC	⇐	1	⇐	P5V-DI	Output	Power
GND	⇒	2	⇒	GND	Input	Power
GND	⇒	3	⇒	GND	Input	Power
+15V	⇐	4	⇐	P12-AI	Output	Power
GND	⇒	5	⇒	GND	Input	Power
-15V	⇐	6	⇐	N12-AI	Output	Power
NC		7		NC	-	-
Tx	⇒	8	⇒	RXD2	Input	Receives data
Rx	⇐	9	⇐	TXD2	Output	Transmits data
~CTS	⇐	10	⇐	~CTS	Output	Clear to Send
~RESET	⇐	11	⇐	~RESET	Output	Reset signal sent
GND	⇒	12	⇒	GND	Input	Power
ECG Sync Input	⇐	13	⇐	QRS-SYNC-I	Output	ECG synchronous output
GND	⇒	14	⇒	GND	Input	Power

J2 optional connector to the flex keypad and LED

(not installed)

PIN	Signal	Direction	Description
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

J3 connector to the module rack

PIN	Signal	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Notifies module rack that this module is connected, by transmitting CMOS logic “0”.
5	~QRS-SYNC-NI	Input	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from Module Rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between SpO2 module & module rack (speed up to19.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between SpO2 module & module rack (speed up to19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power
15	NC	-	Output data of serial communication channel from Module to DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from Module to DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from module to DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	I	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

J4 connector to the P&SB circuit (internal connector)

SPO$_2$		PIN		P&SB	P&SB		PIN		SPO$_2$
-		1A		PA2	GND-DI	⇒	1B	⇒	GND-DI
GND-DI	⇐	2A	⇐	GND-DI	GND-DI	⇒	2B	⇒	GND-DI
GND-DI	⇐	3A	⇐	GND-DI	GND-DI	⇒	3B	⇒	GND-DI
GND-DI	⇐	4A	⇐	GND-DI	GND-DI	⇒	4B	⇒	GND-DI
-		5A		Q0	PB8		5B		-
-		6A		Q1	TOUT2		6B		-
-		7A		Q2	PA6	⇔	7B	⇐	~SWITCH1
-		8A		Q3	Q11		8B		-
LED1-G	⇐	9A	⇐	Q4	PA0	⇔	9B	⇐	RXD2
LED1-R	⇐	10A	⇐	Q5	Q13		10B		-
-		11A		Q6	PB10		11B		-
TXD2	⇐	12A	⇔	PA1	PA9		12B		-
-		13A		PA3	Q8		13B		-
-		14A		PA8	Q7		14B		-
-		15A		PA5	PB11	⇔	15B	⇒	~RESET
-		16A		Q12	PB5		16B		-
-		17A		Q10	PA12		17B		-
-		18A		Q9	~CTS1	⇐	18B	⇐	RTCLK1
-		19A		EXTAL	PA10		19B		-
-		20A		PB3	PB9		20B		-
-		21A		~IRQ1	Q14		21B		-
P12V-AI	⇒	22A	⇒	P12-AI	RXD1	⇐	22B	⇐	RXD-I
-		23A		PA7	TCLK1		23B		-
-		24A		Q15	~CD1		24B		-
-		25A		-	TXD1	⇒	25B	⇒	TXD-I
-		26A		-	RCLK1		26B		-
-		27A		-	~RTS1		27B		-
P5V-DI	⇒	28A	⇒	P5V-DI	P5V-DI	⇐	28B	⇐	P5V-DI
P5V-DI	⇒	29A	⇒	P5V-DI	P5V-DI	⇐	29B	⇐	P5V-DI
P5V-DI	⇒	30A	⇒	P5V-DI	P5V-DI	⇐	30B	⇐	P5V-DI

J5 and J6 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J6 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J5 connects to the GND of module rack to provide reference for signals between the module and module rack

JP1 OEM sensor interface connector

PIN	Signal
1	Anode (detector)
2	NC
3	NC
4	Cathode (detector shield)
5	GND (RCAL return)
6	RCAL
7	-LED
8	NC
9	+LED
10	GND

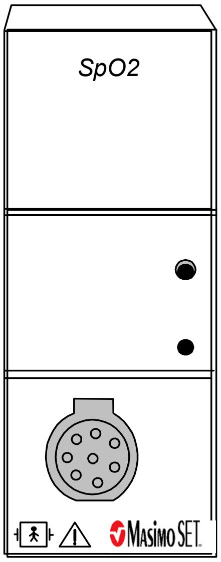
J10 front panel connector

PIN	Signal
1	GND (RCAL return)
2	+LED
3	NC
4	RCAL
5	-LED
6	Anode (detector)
7	Cathode (detector shield)
8	GND

2.13 SpO2 Module (Masimo): Functional Description

2.13.1 Overview

Figure 2-34: SpO2 Module (Masimo) – Front Panel



The SpO2 module measures the patient's arterial oxygen saturation and pulse rate. Arterial oxygen saturation is the percentage of oxygenated hemoglobin in relation to the total hemoglobin. For example, if 95 percent of the hemoglobin molecules in the arterial red blood cells combine with oxygen, the blood has an oxygen saturation of 95 percent. The SpO2 numeric value represents the percentage of hemoglobin molecules that have combined with oxygen molecules to form oxyhemoglobin.

The SpO2 module measures oxygen saturation using the Pulse Oximetry method. This continuous, non-invasive method measures the light absorption in the patient's tissue (for example, using a finger probe).

Absorption by tissue and venous blood is constant. However, the blood flow in the arterioles is pulsatile and, therefore, varies with time. Measuring light absorption during pulsation can derive oxygen saturation of the arterial blood.

The ***Envoy*** provides continuous monitoring of arterial oxygen saturation expressed as a percentage. Moment-to-moment variations in capillary filling are presented as a continuous pulse waveform. The pulse rate is derived from the pulse waveform.

The SpO2 single-size module is housed in the ***Envoy*** module rack, where it occupies one slot.

2.13.2 Block Diagram Description

The SpO2 module consists of an OEM Pulse Oximetry module, an interface circuit and P&SB circuit. The OEM Pulse Oximetry module is a third party sub-module (Masimo model MS-5) which performs the actual SpO2 functions.

The OEM Pulse Oximetry module provides the data to the P&SB circuit through the SpO2 interface (see *Figure 2-49*).

The communication between the SpO2 module and the P&SB circuit has the following characteristics:

Speed:	9600 bps
Physical layer:	TTL levels
Data Link layer:	Serial, full duplex, asynchronous (derivative of RS-232). Start bit, 8 data bits, 1 parity bit (even), 1 stop bit. No handshake signals.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see Section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed:	up to 19200 bps
Physical layer:	TTL/CMOS levels
Data Link layer:	Serial, full duplex, asynchronous point-to-point link.

The interface circuit consists of the following:

- Voltage regulator circuit that regulates the input voltage from the module rack for the P&SB circuit, OEM Pulse Oximetry module and the flex keypad & LED.
- Isolation circuit that provides electrical isolation between the module rack and the patient. The isolation circuit consists of opto-couplers and DC voltage couplers for the 12 V input from the module rack.
- Six connectors to connect the OEM Pulse Oximetry module, P&SB, Module Rack and the flex keypad & LED.

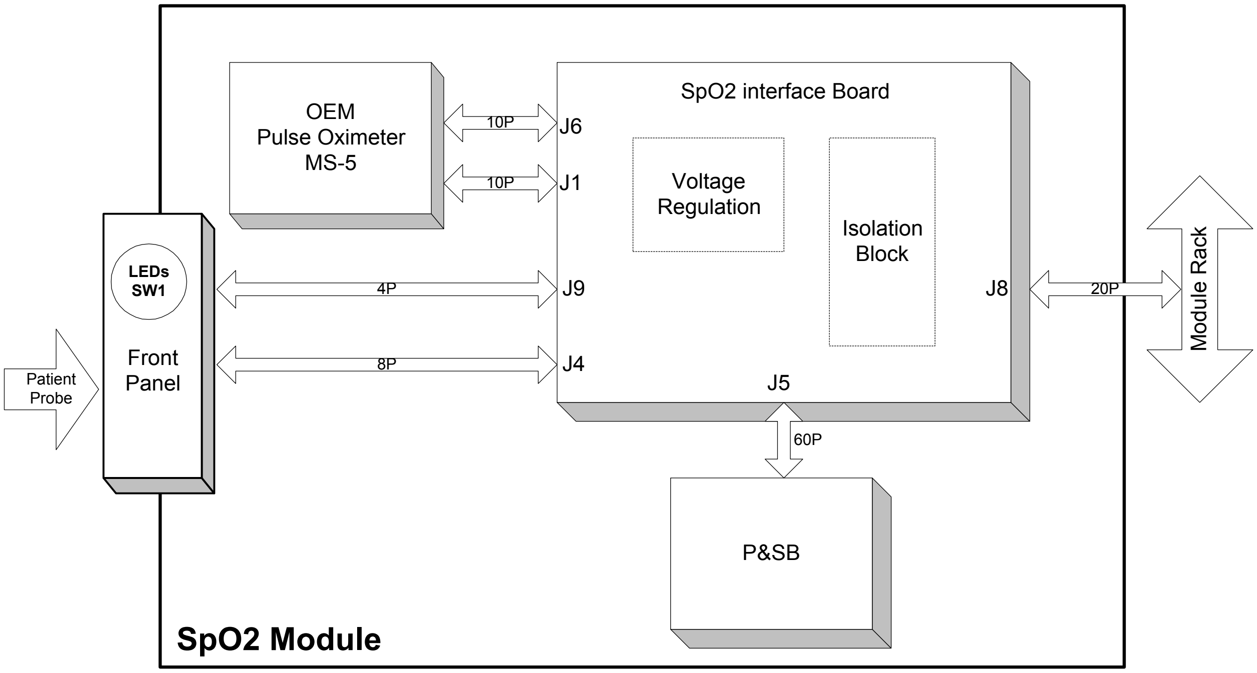

OEM
Pulse Oximeter
MS-5
10P
J6
10P
J1
SpO2 interface Board
Voltage
Regulation
Isolation
Block
LEDs
SW1
Front
Panel
Patient
Probe
4P
J9
8P
J4
J8
20P
Module Rack
J5
60P
P&SB
SpO2 Module

Figure 2-35. SpO2 Module - Block Diagram

2.13.3 Connectors Description

The SpO2 Module includes the following connectors:

- J1 – Power and Communication connector to the OEM.
- J2, J3 - ground studs connectors
- J4 –sensor connector to front panel.
- J5 - connector to the P&SB circuit
- J6 - sensor connector to OEM
- J8 - connector to the Module Rack
- J9 - connector to the flex keypad and LED
- J10 front panel connector

J1 connector to J3 on OEM Pulse Oximetry module

JP5 on OEM PO		PIN		SpO2 Interface	Direction	Description
VCC	⇐	1	⇐	P5V-DI	O	Power
GND	⇒	2	⇒	GND	I	Power
NC		3		NC	-	-
GND	⇒	4	⇒	GND	O	Power
NC		5		NC	-	-
GND	⇒	6	⇒	GND	O	Power
~RESET	⇐	7	⇐	~RESET	O	Reset signal sent
DAV	⇐	8	⇐	DAV	I	Data available
Tx	⇒	9	⇒	RXD2	I	Receives data
Rx	⇐	10	⇐	TXD2	O	Transmits data

J9 Flex keypad and LED connector

PIN	Signal	Direction	Description
1	GND	O	Power
2	LED1-R	O	Red LED
3	LED1-G	O	Green LED
4	SW1	I	Switch

J8 connector to the module rack

PIN	Signal	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Notifies module rack that this module is connected, by transmitting CMOS logic “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from Module Rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between SpO2 module & module rack (speed up to19.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between SpO2 module & module rack (speed up to19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power
15	NC	-	Output data of serial communication channel from Module to DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from Module to DAC (in module rack) to

PIN	Signal	Direction	Description
			produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from module to DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	I	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

J5 connector to the P&SB circuit (internal connector)

SpO2		PIN		P&SB	P&SB		PIN		SpO2
-		1A		PA2	GND-DI	⇒	1B	⇒	GND-DI
GND-DI	⇐	2A	⇐	GND-DI	GND-DI	⇒	2B	⇒	GND-DI
GND-DI	⇐	3A	⇐	GND-DI	GND-DI	⇒	3B	⇒	GND-DI
GND-DI	⇐	4A	⇐	GND-DI	GND-DI	⇒	4B	⇒	GND-DI
-		5A		Q0	PB8		5B		-
-		6A		Q1	TOUT2		6B		-
-		7A		Q2	PA6	⇔	7B	⇐	~SWITCH1
-		8A		Q3	Q11		8B		-
LED1-R	⇐	9A	⇐	Q4	PA0	⇔	9B	⇐	RXD2
LED1-G	⇐	10A	⇐	Q5	Q13		10B		-
-		11A		Q6	PB10		11B		-
TXD2	⇐	12A	⇔	PA1	PA9		12B		-
-		13A		PA3	Q8		13B		-
-		14A		PA8	Q7		14B		-
-		15A		PA5	PB11	⇔	15B	⇒	~RESET
-		16A		Q12	PB5		16B		-
-		17A		Q10	PA12		17B		-
-		18A		Q9	~CTS1	⇐	18B	⇐	RTCLK1
-		19A		EXTAL	PA10		19B		-
-		20A		PB3	PB9		20B		-
-		21A		~IRQ1	Q14		21B		-
P5V-DI	⇒	22A	⇒	P12-AI	RXD1	⇐	22B	⇐	RXD-I
-		23A		PA7	TCLK1		23B		-

SpO2		PIN		P&SB	P&SB		PIN		SpO2
-		24A		Q15	~CD1		24B		-
-		25A		-	TXD1	⇒	25B	⇒	TXD-I
-		26A		-	RCLK1		26B		-
-		27A		-	~RTS1		27B		-
P5V-DI	⇒	28A	⇒	P5V-DI	P5V-DI	⇐	28B	⇐	P5V-DI
P5V-DI	⇒	29A	⇒	P5V-DI	P5V-DI	⇐	29B	⇐	P5V-DI
P5V-DI	⇒	30A	⇒	P5V-DI	P5V-DI	⇐	30B	⇐	P5V-DI

J2 and J3 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J3 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J2 connects to the GND of module rack to provide reference for signals between the module and module rack

JP1 OEM sensor interface connectors to OEM Pulse Oximeter sensor connector (J6)

PIN	Signal
1	Anode
2	Cathode
3	Inner shield
4	Inner shield
5	NC
6	Outer shield
7	Ircat
8	Outer shield
9	Redcat
10	NC

J4 front panel connector

PIN	Signal
1	Anode
2	Cathode
3	Inner shield
4	Outer shield
5	Ircat
6	Redcat
7	GND
8	Cable in

2.14 Dual EtCO2 Module Functional Description

2.14.1 Overview

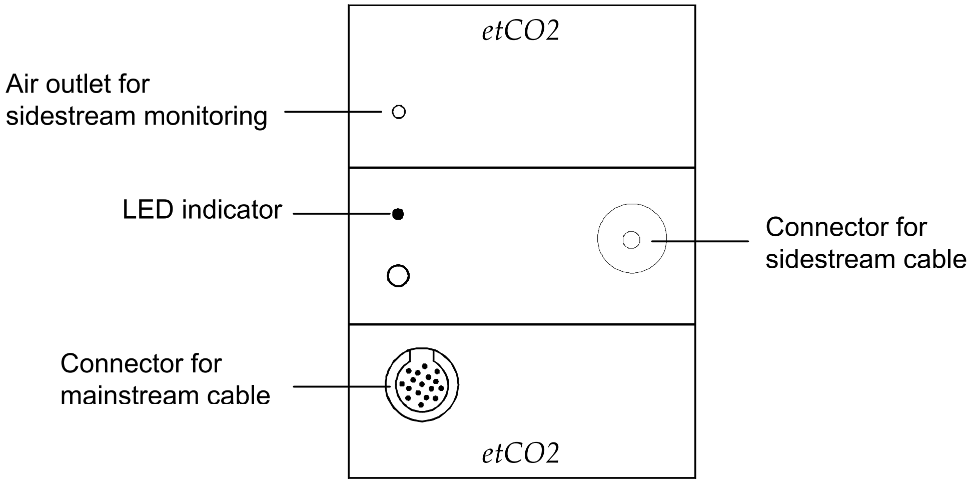

etCO2
Air outlet for sidestream monitoring
LED indicator
Connector for sidestream cable
Connector for mainstream cable
etCO2

Figure 2-36. EtCO2 Module – Front Panel

The End Tidal CO_2 (EtCO2) module together with the OEM Pryon dual mainstream/sidestream CO_2 control (DuET) sensor provides CO_2 measurement data to the MPU through the module rack.

The EtCO2 dual-size module is housed in the ***Envoy*** module rack, where it occupies two slots. It supports both mainstream and sidestream monitoring.

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and on	Module is fully functional and monitoring
LED is red and blinking	Module is warming up
LED is red and on	Technical fault (i.e., cable connected incorrectly)

Caution:

Use only Mennen Medical approved Sampling tubes and filters. Sampling tubes are for single patient use.

Warning:

Prevent fluids from entering the sampling tube and module. Fluids will cause module failure.

2.14.2 Block Diagram Description

The EtCO2 module consists of an interface circuit and P&SB circuit. The OEM Pryon DuET sensor provides the data to the P&SB circuit through the EtCO2 interface (see Figure 2-30).

The communication between the OEM Pryon DuET sensor and the P&SB circuit has the following characteristics:

Speed: 9600 bps

Physical layer: TTL levels

Data Link layer: Serial, full duplex, asynchronous (derivative of RS-232).
Start bit, 8 data bits, 1 parity bit (even), 1 stop bit.
No handshake signals.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed: up to 19200 bps

Physical layer: TTL/CMOS levels

Data Link layer: Serial, full duplex, asynchronous point-to-point link.

The interface circuit consists of the following:

- Two 12 V DC/DC converters to supply isolated 10 V to the 8 V voltage regulator.
- A 10 V to 5 V linear regulator for the P&SB circuit and the flex keypad & LED.
- Flex keypad & LED that is connected to the I/O port of the P&SB circuit.
- A 10 V to 8 V switching regulator to supply isolated 8 V for the OEM Pryon DuET sensor.

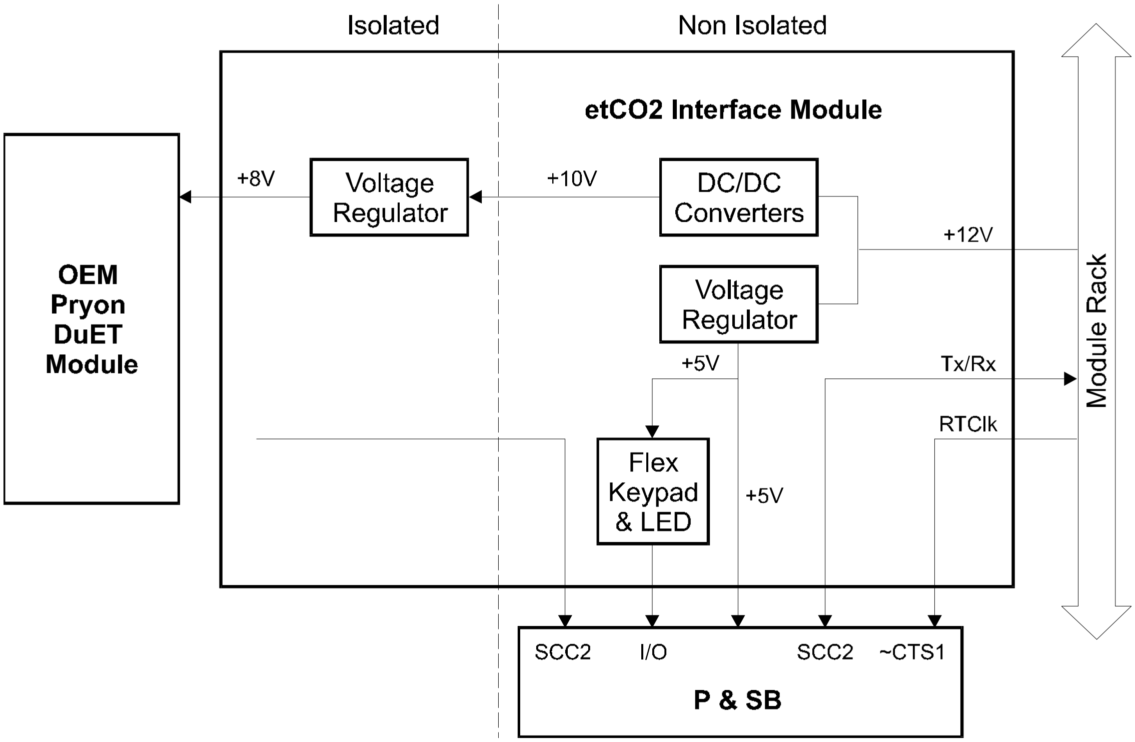

Isolated
Non Isolated
etCO2 Interface Module
OEM Pryon DuET Module
+8V
Voltage Regulator
+10V
DC/DC Converters
+12V
Voltage Regulator
+5V
Tx/Rx
RTClk
Flex Keypad & LED
+5V
Module Rack
SCC2
I/O
SCC2
~CTS1
P & SB

Figure 2-37. EtCO2 Module - Block Diagram

2.14.3 Connectors Description

The EtCO2 Module includes the following connectors:

- J1 connector to the OEM Pryon DuET sensor
- J2 and J3 ground studs
- J4 connector to the P&SB circuit (internal connector)
- J5 connector to the module rack
- J6 optional connector to the flex keypad and LED

J1 connector to the OEM Pryon DuET sensor

Pryon		PIN		EtCO2	Description
VISO	⇐	1	⇐	Vin	Power
GND	⇒	2	⇒	GND	Ground
Tx	⇒	3	⇒	RxD	Data from Pryon to EtCO2
Rx	⇐	4	⇐	TxD	Data from EtCO2 to Pryon

J2 and J3 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J2 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack

J4 connector to the P&SB circuit (internal connector)

EtCO2		PIN		P&SB	P&SB		PIN		EtCO2
-		1A		PA2	GND-A	⇒	1B	⇒	GND-A
GND-A	⇐	2A	⇐	GND-A	GND-A	⇒	2B	⇒	GND-A
GND-A	⇐	3A	⇐	GND-A	GND-A	⇒	3B	⇒	GND-A
GND-A	⇐	4A	⇐	GND-A	GND-A	⇒	4B	⇒	GND-A
-		5A		Q0	PB8		5B		-
-		6A		Q1	TOUT2		6B		-
-		7A		Q2	PA6	⇔	7B	⇐	~SWITCH1
-		8A		Q3	Q11		8B		-
LED1-G	⇐	9A	⇐	Q4	PA0	⇔	9B	⇐	RxD2
LED1-R	⇐	10A	⇐	Q5	Q13		10B		-
-		11A		Q6	PB10		11B		-
TxD2	⇐	12A	⇔	PA1	PA9		12B		-
-		13A		PA3	Q8		13B		-
-		14A		PA8	Q7		14B		-
-		15A		PA5	PB11		15B		-
-		16A		Q12	PB5		16B		-
-		17A		Q10	PA12		17B		-
-		18A		Q9	~CTS1	⇐	18B	⇐	RTCLK1
-		19A		EXTAL	PA10		19B		-
-		20A		PB3	PB9		20B		-
-		21A		~IRQ1	Q14		21B		-
P12V-NI	⇒	22A	⇒	P12	RXD1	⇐	22B	⇐	RXD1

EtCO2		PIN		P&SB	P&SB		PIN		EtCO2
-		23A		PA7	TCLK1		23B		-
-		24A		Q15	~CD1		24B		-
-		25A		-	TXD1	⇒	25B	⇒	TXD1
-		26A		-	RCLK1		26B		-
-		27A		-	~RTS1		27B		-
P5V-NI	⇒	28A	⇒	P5V-NI	P5V-NI	⇐	28B	⇐	P5V-NI
P5V-NI	⇒	29A	⇒	P5V-NI	P5V-NI	⇐	29B	⇐	P5V-NI
P5V-NI	⇒	30A	⇒	P5V-NI	P5V-NI	⇐	30B	⇐	P5V-NI

J5 connector to the module rack

PIN	Signal *	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Module present notification signal. Notifies the module rack that this module is connected, by transmitting “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power

PIN	Signal *	Direction	Description
15	NC	-	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

- Direction related to EtCO2 interface

J6 optional connector to the flex keypad and LED

PIN	Signal	Direction	Description
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

2.15 Mainstream EtCO2 Module Functional Description

2.15.1 Overview

The Mainstream EtCO2 Module, (MEM), PN 551-135-000, is a single density module that plugs into the Envoy Module Rack, and is equipped with a serial data interface for asynchronous communication with external monitors and devices having different formats or protocols. The device input is through a 5 pin DIN connector on the front panel. It stores a database of interface code for up to 31 different external devices.

Definitions and Acronyms used in this section:

MPU	Main processor Unit
MR	Module Rack
MEM	Mainstream EtCO2 Module

Reference document:

- Electrical schematic: 551-245-000

The MEM occupies one slot in the ***Envoy*** module rack.

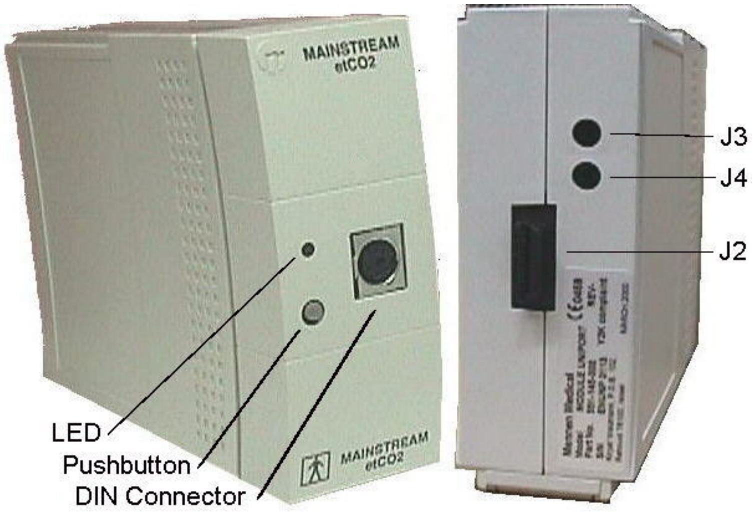


Figure 2-38. Mainstream EtCO2 module – front & rear views

2.15.2 Block Diagram Description

The MEM can provide a generic platform for interfacing to external devices that communicate with a serial TTL interface. The inputs are jumpered around RS-232 converter, which is not used on the slim board. The block diagram shown in the figure below illustrates a "black box" view of the MEM with interfaces to external devices:

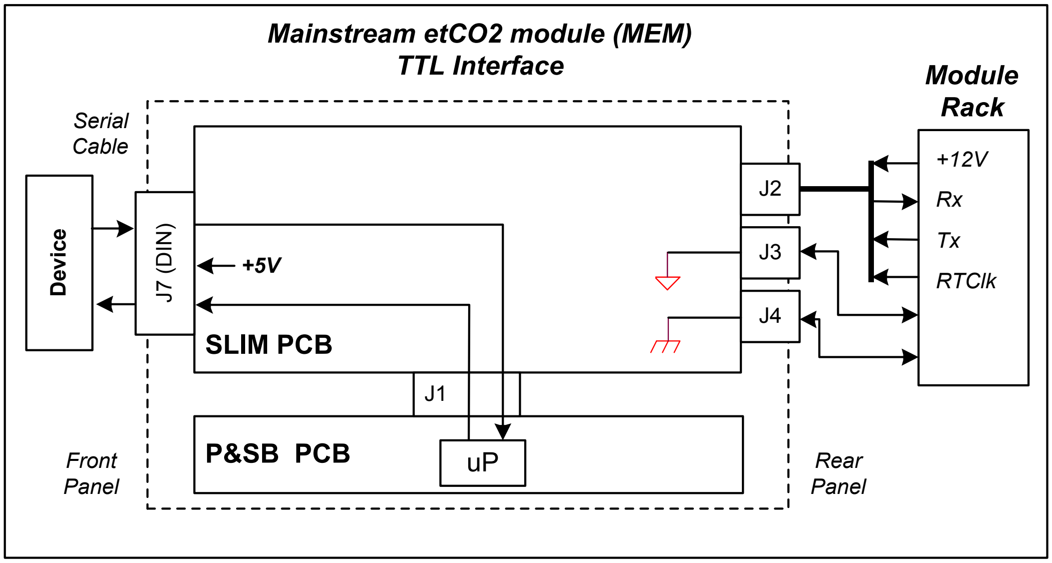

Mainstream etCO2 module (MEM)
TTL Interface
Module
Rack
Serial
Cable
Device
J7 (DIN)
+5V
SLIM PCB
J1
P&SB PCB
uP
J2
J3
J4
+12V
Rx
Tx
RTClk
Front
Panel
Rear
Panel

Figure 2-39: RS-232 MEM Block Diagram

The MEM itself, shown within the dotted outline, consists of the following items:

- 2 Printed Circuit Boards (PCBs) containing the module electronics
- operational software for the MEM
- a front panel containing a 5-pin DIN connector for the serial TTL interface, a 2-color LED, and a pushbutton
- a module enclosure for housing the above items

As seen above, the MEM is capable of acquiring patient waveform and vital sign data from the external devices via its serial link interfaces. Following analysis for alarm and instrument fault conditions, this data is packaged according to the NGMS protocol and sent to the MPU for further analysis and display. Besides providing the +12V power source for the MEM, the Module Rack provides the following signal interfaces:

- Rx/Tx Asynchronous communication with the MPU. These lines are used for transferring waveforms and vital signs from the MEM to the MPU, as well as for passing control signals (e.g. parameters) from the MPU to the MEM. (The Module Rack's involvement in this signal is to combine the communication channels from all the modules into a single line connected to the MPU. Because of the higher data density this single line connection is done at a higher speed and goes through the Hi-speed Comm block in the MPU.
- RTClk Synchronization pulse for real time clock. Originating in the System Clock in the MPU, this signal periodically calibrates all the Module clocks, ensuring that they are all set equal to the system time.

Features:

- **External Device Identification** The identity of each external device connected to the MEM is received from the MPU. Upon receipt of this information, the MEM changes the communication parameters of the affected port to match those of the external device.
- **Module Management** The MEM is capable of performing the module management and identification functions with the Module Rack.
  The handshaking includes vendor definition sent by the MPU. The MEM is capable of performing the module management and identification functions in accordance with the Module Rack ICD. Messages are added to inform the MEM of the vendors attached to a specific serial port. The MEM also reports the version number of its software to the MPU.
- **Communication** The MEM is capable of managing all communication with the Module Rack for up to three external serial devices. After identifying the external monitor or device, the module changes its communication settings for the specific port to match the settings of the external device. The module is capable of determining the protocol based on the detected cable ID.
  The communication timeout period for an external device is 10 seconds.
- **Data Collection** The MEM is capable of retrieving VS and waveform data, as well as status, from each external serial device. Additional messages are added for vendor identification to the MEM. Trend data for pertinent vital signs is also accumulated and stored.
- **Analysis** The MEM examines the vital sign and status data received from the external monitors and devices, and determines if any clinical or technical alarm conditions exist. Clinical alarm conditions, as well as the enable/disable status for these conditions, are based on the settings
  received from the MPU.

- **Debug Support** MEM Debug support shall be accomplished by attaching a Mennen piggyback XRAY board (PN 551-299-100) to the Processor board via metal posts on the Processor board. In this configuration, the debug executive will be loaded into on board Flash memory instead of the application code.
- **Supply Voltage** Power for the MEM is derived from the Module Rack's 12V supply, and the power consumption shall not exceed 4.0W (330mA from +12V). A separate +5V supply, derived from the on-board +12V, powers external devices.
- **Control Hardware** The Motorola MC68LC302 Low Power Integrated Multi-protocol Processor (IMP), used on all the current modules, is used for the MEM. This processor integrates a high speed M68000 processor with multiple communication peripherals. One of these peripherals is the SCC1 communication channel, which supports communication with the module rack. The IMP has an on-chip oscillator and phased locked loop (PLL). A 32.768 khz crystal is used for the IMP clock.

The flash memory is divided into 2 functional areas: Code Storage and Configuration and Patient Data Storage. A minimum of .5 Mbytes of flash memory (256k x 16 bit words) is provided for program code storage, permitting up to 31 interfaces to be programmed in the module. For Configuration and patient storage, the hardware shall support either 2 Mbit (128k x 8bit x 2) or 4 Mbit (256k x 8 bit x 2) flash size. This storage, built from two 8 bit wide devices, will allow access for both 16 bit and 8 bit read/write operations.

The MC68LC302 Uart is used to support the serial interfaces to the external devices. For the MEM, RS-232-to-TTL and TTL-to-RS-232 buffers are provided for interfacing the TTL level components on the board to the external RS-232 signal levels.

The module provides isolation between the Envoy and the external instruments. In addition, the connections to each of the external instruments are isolated from each other.

- **Front Panel control and indication** Presently, the front panel push-button is an option. The Front Panel pushbutton is monitored to determine if it has been pressed. When a button press has been detected, a button press message for the push-button will be sent to the MPU. The 2 color LED on the front panel is under direct software control of the module. The LED is illuminated green when the associated link is functional, and is illuminated red when there is a link failure.
- **Software Modularity** The software is designed in a modular manner to facilitate the addition of code for new external serial monitors and devices.

The code is composed of:

- A common management section, consisting of system timing, detection of external serial data link devices, data analysis, managing the communication with the module rack, front panel push-button and LED management, and real time OS functions such as task definition, queue definition, etc.
- External Device specific code, which sets the communication parameters for the serial port, decodes messages received from external devices, encodes messages transmitted to external devices, detects a technical alarm, and collects VS and waveform data.

The Mainstream EtCO2 slim board sends a serial bit stream to the Processing and Storage Block (P&SB) PCB.

The P&SB PCB, which contains a powerful communications processor (Motorola MC68LC302) and memory, performs the control, signal processing, communications interface and computation for the Mainstream EtCO2 module. Each time the P&SB receives a packet from the Mainstream EtCO2 slim board, it separates the samples, stores them locally in its high speed memory, performs some specialized signal processing on the samples and, finally, wraps them in a suitable communications protocol and sends them off to the Module Rack.

In addition to sample processing, the P&SB provides many control lines to various blocks on the Module thereby allowing the hardware to be controlled by the software. The Isolation block electrically isolates the Module from the Module Rack so as to provide safety for the patient and for the operator of the MPU.

As shown at the right side of the figure, the Module is powered by the +12V supply of the Module Rack. Also shown are other signals between the Module Rack and the Module. The Rx and Tx signals provide bi-directional asynchronous communications between the Module and Module Rack. The RTClk signal generated by the Module Rack allows the Module's real time clock to be synchronized with all the other clocks in the Envoy system.

2.15.3 Connectors Description

The front panel contains a 5-pin DIN connector for communication with external devices/monitors. Below are the pin designations for the interfaces with an external monitor. Direction is with respect to the module:

Pin #	Title	Direction	Family
1	Ground	--	
2	VCC	Output	5 volts @ 500 milliamps minimum
3	RX	Output	RS-232
4	Reserved	--	--
5	Gnd	--	--
S1	Shield Ground	--	--
S2	Shield Ground	--	--

Table 3 MEM DIN Connector Pin Assignments on front panel

Ground studs (SLIM - J3, J4)

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J4 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack.

Module Rack (SLIM – J2)

The pin designations for the 20 pin Module Rack connector are shown below in Table 4: Direction of signal names is with respect to the MEM.

Pin #	MEM	Direction	MR	Active	Logic Family
1	GND	n/a	GND	n/a	
2	GND	n/a	GND	n/a	
3	GND	n/a	GND	n/a	
4	MPRES	→	MPRES	LOW	
5	n/c	→	QRS_SYNC	LOW	
6	n/c	←	OUT_D_DAC	LOW	
7	n/c	←	OUT_CLK_DAC	LOW	
8	TXD_NI	→	RX	LOW	
9	n/c	→	ECG_RX	LOW	
10	RXD	←	TX	LOW	
11	+12V	n/a	+12V	n/a	
12	+12V	n/a	+12V	n/a	
13	+12V	n/a	+12V	n/a	
14	+12V	n/a	+12V	n/a	
15	N/C	→	IN_D_DAC	LOW	
16	N/C	→	IN_CLK_DAC	LOW	
17	N/C	→	IN_SEL_DAC	LOW	
18	RTCLK	←	RTCLK	FALLING EDGE	
19	N/C	←	OUT_SEL_DAC	LOW	
20	N/C	←	ECG_TX	LOW	

Table 4: Pinout of Module Rack Connections – connector in rear of module

2.16 *MicroStream EtCO2 Module*

2.16.1 Overview

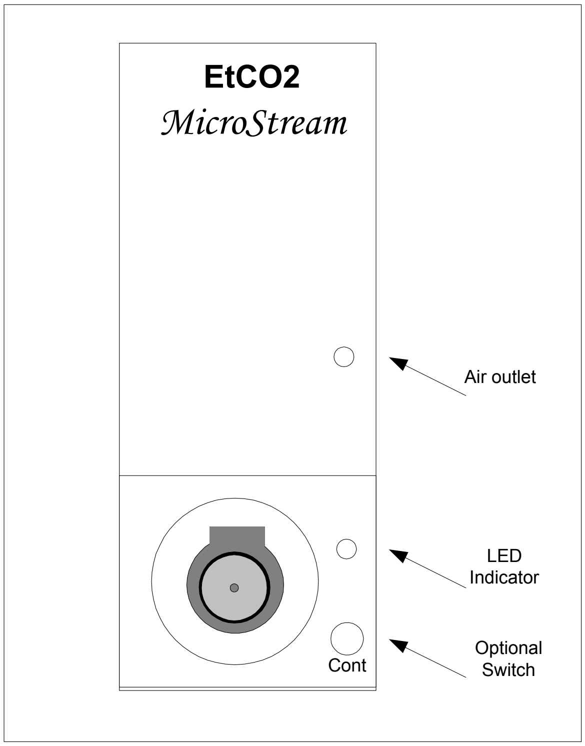


Figure 2-40. EtCO2 Module – Front Panel

The End Tidal CO_2 (EtCO2) module together with the Oridion sidestream CO_2 control) sensor provides CO_2 measurement data to the MPU through the module rack.

Principles of Operation

Envoy's End Tidal CO2 (EtCO2) module uses Non-Dispersive Infrared Spectroscopy (NIDS) with single beam, single detector and fully chopped ratiometric measurement with spinning gas cell.

The EtCO2 module uses infrared (IR) light to measure the concentration of CO2 in a sample of respiratory gas. It then measures the inspiratory and end tidal (end expiratory) CO2 levels (inCO2 and EtCO2) and converts the data to percentages or mmHg. Changes in carbon dioxide levels are displayed graphically as a CO2 waveform. The *MicroStream* EtCO2 module uses sidestream monitoring with low sampling volume of 50 ml/min.

In Sidestream monitoring, a tube is attached to the patient's airway circuit.

Respiratory gas is then drawn into the tube and sent to an IR sensor in a separate measuring device. This method can be used on patients who are not intubated. The unit performs automatic barometric pressure compensation to adjust the CO2 reading for changes due to pressure fluctuations. The barometric pressure is determined continuously in the mainstream mode and during power-up in the sidestream mode. The system incorporates an internal pressure transducer that measures barometric pressure continuously. The EtCO2 module value is given in mmHg or as a percentage. The effects of humidity are eliminated by a Nafion dryer tube and a filter in the sampling set.

The unit automatically senses when a sampling tube is installed and begins drawing a gas sample for sidestream operation.

Intended Use

The *Envoy*'s End Tidal CO2 (EtCO2) Microstream, module is intended for use with both intubated and non-intubated patients. The module uses real-time data to calculate and display the numerical values for End-tidal carbon dioxide (EtCO2), inspired carbon dioxide (inCO2) and Respiration rate.

Cleaning

Airway Adapter

The airway adapter is intended for use on a single patient and should be discarded after use. Do not attempt to clean with air or Oxygen

Calibration

The EtCO2 module performs auto zero calibrating when there is a change in the internal temperature of the module. It will happen about every hour after starting the module and every about 12 hour when the module works continuously and temperature stabilizes.

Annually, it will require perform span calibration with standard CO2 concentration. The calibration procedure is described in Chapter 5 – System Setup, of the service manual

The EtCO2 single-size module is housed in the ***Envoy*** module rack, where it occupies one slots. It supports both side stream monitoring.

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and on	Module is fully functional and monitoring
LED is red and blinking	Module is warming up
LED is red and on	Technical fault (i.e., cable connected incorrectly)

Caution:

Use only Mennen Medical approved Sampling tubes. Sampling tubes are for single patient use.

Warning:

Prevent fluids from entering the sampling tube and module. Fluids will cause module failure

2.16.2 Block Diagram Description

The EtCO2 module includes 2 parts:

1. Interface board which includes the P&SB board as part of the circuits.
2. Oridion MiniMediCO2 OEM.

The interface board includes power regulator for the OEM and communication processor for controlling the OEM.

The communication between the OEM to the interface board is via uart interface with RS232 level with the following parameters:

Speed: 9600 bps

Physical layer: RS232 levels

Data Link layer: Serial, full duplex, asynchronous (derivative of RS-232).
Start bit, 8 data bits, 1 parity bit (even), 1 stop bit.
No handshake signals.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed: up to 19200 bps

Physical layer: TTL/CMOS levels

Data Link layer: Serial, full duplex, asynchronous point-to-point link.

The interface circuit consists of the following:

- 12 V DC which supply from the MR.
- 5 V DC for the digital circuits which supply from switch regulator.

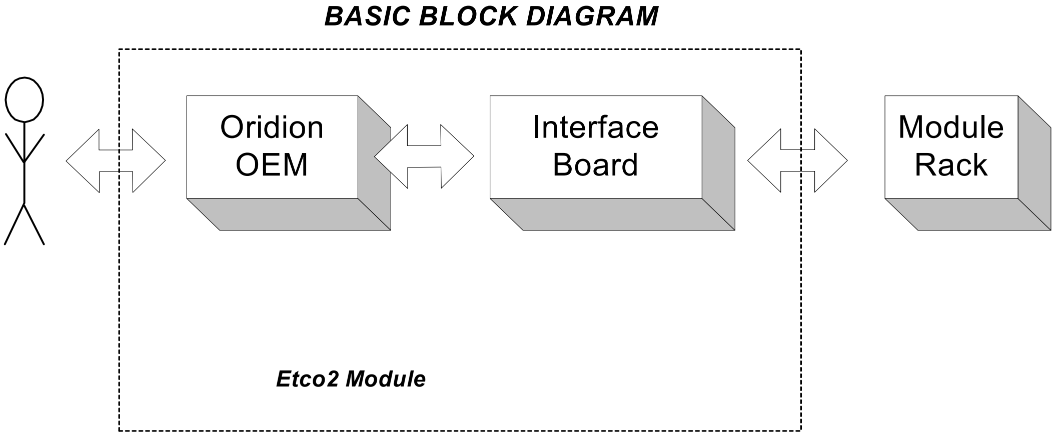

BASIC BLOCK DIAGRAM
Oridion OEM
Interface Board
Module Rack
Etco2 Module

Figure 2-41. EtCO2 Module - Block Diagram

- The Oridion MiniMediCO2 OEM
- Mennen interface board which include the P&SB design.

2.16.3 Connectors Description

The EtCO2 Module includes the following connectors:

- J9 & J10 – GND connectors
- J6 – Connector to module rack.
- J3 – Connector to OEM.
- J2- Flex Connector.
- J1 – BDM Connector

J9 and J10 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J2 connects first to chassis ground of module rack, to provide a path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack

J6 connector to the module rack

PIN	Signal *	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Module present notification signal. Notifies the module rack that this module is connected, by transmitting “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power

PIN	Signal *	Direction	Description
15	NC	-	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

- Direction related to EtCO2 interface

J3 – OEM Connector:

PIN	Signal *	Direction	Description
1	GND		
2	5 VDC		
3	GND		
4	5 VDC		
5	GND		
6	12 VDC		
7	GND		
8	12 VDC		
9	CO2 TXD	Out	Transmit line from the OEM to the interface board.
10	NC		
11	CO2 Reset	In	Reset line from the interface board to the OEM.
12	CO2 RXD	In	OEM receive line.
13	NC		
14	NC		

J2 optional connector to the flex keypad and LED

PIN	Signal	Direction	Description
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

2.17 Uniport Module Functional Description

2.17.1 Overview

The Uniport Module, (UM), PN 551-145-000, is a single density module that plugs into the Envoy Module Rack, and is equipped with a serial data interface for asynchronous communication with external monitors and devices having different formats or protocols. The device input is through an RJ45 connector on the front panel. It stores a database of interface code for up to 31 different external devices.

Definitions and Acronyms used in this section:

MPU	Main processor Unit
MR	Module Rack
UM	Uniport Module

Reference document:

- Electrical schematic: 551-245-000

- **Interface to Vendor Equipment**

The Uniport and UIM support Interface with the following vendor equipment.

Each device needs an interface cable.

See the following table for the Interface Cable types.

Important: *Use only Mennen Medical Interface cables.*

Device	Interface Cable P/N
Anesthesia Drager Cicero B	551-345-053
Anesthesia Drager Cicero EM	551-345-053
Anesthesia Drager Julian	551-345-052
Anesthesia gas analyzer 4700	551-345-050
Anesthesia gas analyzer 4800	551-345-050
SvO2 & CCO Baxter Vigilance	551-345-060
TC Gas Microgas Kontron	551-345-054
TC Gas TCM3 Radiometer	551-345-055

Device	Interface Cable P/N
Ventilator 7200 Puritan Bennett	551-345-056
Ventilator 840 Puritan Bennett	551-345-057
Ventilator Drager Evita 4, Evita 2 dura	551-345-058

Table 1: **Interface cables**

- **Vendor Device Setup**

  When the UIM is to be connected to a vendor device, the device must have serial communication option. Refer to the Vendor Device manual to confirm that the device is equipped with serial communication.

  Set the Vendor device communication parameters as per the table below:

Device	Baud rate	Number of bits	Parity	Stop bits
Anesthesia Drager Cicero B	9600	8	Even	1
Anesthesia Drager Cicero EM	9600	8	Even	1
Anesthesia Drager Julian	9600	8	Even	1
Anesthesia gas analyzer 4700	19200	8	No	1
Anesthesia gas analyzer 4800	19200	8	No	1
SvO2 & CCO Baxter Vigilance	19200	8	No	1
TC Gas Microgas Kontron	9600	7	Even	1
TC Gas TCM3 Radiometer	2400	7	Odd	1
Ventilator 7200 Puritan Bennett	9600	7	Odd	1
Ventilator 840 Puritan Bennett	9600	7	Odd	1
Ventilator Drager Evita 4, Evita 2 dura	19200	8	Even	1

The UM occupies one slot in the ***Envoy*** module rack.

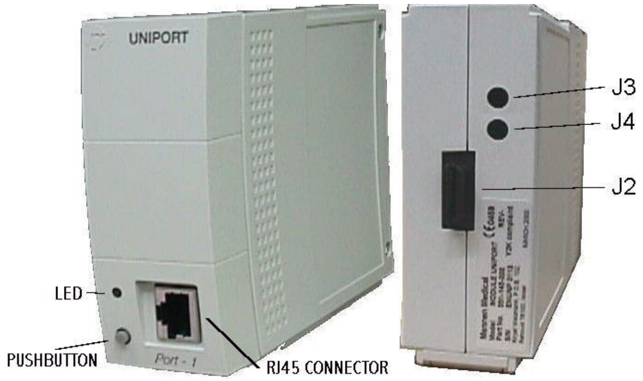

UNIPORT
J3
J4
J2
LED
PUSHBUTTON
Port - 1
RJ45 CONNECTOR

Figure 2-42. Uniport module – front & rear views

2.17.2 Block Diagram Description

The UM is used as a generic platform to interface to any external device or monitor equipped with an RS-232 asynchronous communications interface. The block diagram, shown below in *Figure 2-38*, illustrates a "black box" view of the UM with interfaces to external devices:

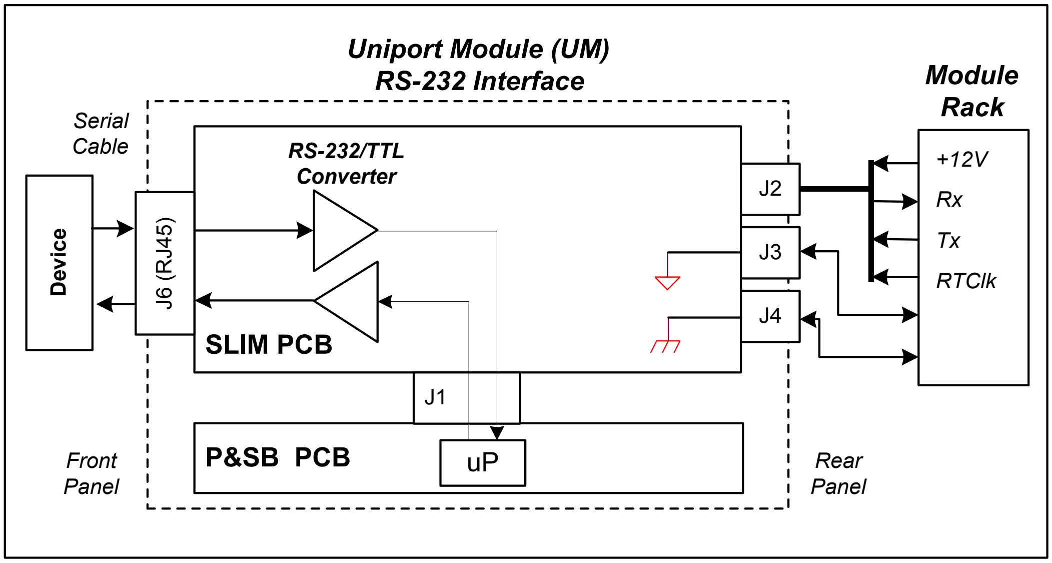

Uniport Module (UM)
RS-232 Interface
Module Rack
Serial Cable
RS-232/TTL Converter
Device
J6 (RJ45)
J2
J3
J4
+12V
Rx
Tx
RTClk
SLIM PCB
J1
P&SB PCB
uP
Front Panel
Rear Panel

Figure 2-43: RS-232 UM Block Diagram

The UM itself, shown within the dotted outline, consists of the following items:

- 2 Printed Circuit Boards (PCBs) containing the module electronics
- operational software for the UM
- a front panel containing an RJ45 connector for the serial interface, a 2-color LED, and a pushbutton
- a module enclosure for housing the above items

As seen above, the UM is capable of acquiring patient waveform and vital sign data from the external devices via its serial link interfaces. Following analysis for alarm and instrument fault conditions, this data is packaged according to the NGMS protocol and sent to the MPU for further analysis and display. Besides providing the +12V power source for the UM, the Module Rack provides the following signal interfaces:

- **Rx/Tx** Asynchronous communication with the MPU. These lines are used for transferring waveforms and vital signs from the UM to the MPU, as well as for passing control signals (e.g. parameters) from the MPU to the UM. (The Module Rack's involvement in this signal is to combine the communication channels from all the modules into a single line connected to the MPU. Because of the higher data density this single line connection is done at a higher speed and goes through the Hi-speed Comm block in the MPU.
- **RTClk** Synchronization pulse for real time clock. Originating in the System Clock in the MPU, this signal periodically calibrates all the Module clocks, ensuring that they are all set equal to the system time.

Features:

- **External Device Identification** The identity of each external device connected to the UM is received from the MPU. Upon receipt of this information, the UM changes the communication parameters of the affected port to match those of the external device.
- **Module Management** The UM is capable of performing the module management and identification functions with the Module Rack. The handshaking includes vendor definition sent by the MPU. The UM is capable of performing the module management and identification functions in accordance with the Module Rack ICD. Messages are added to inform the UM of the vendors attached to a specific serial port. The UM also reports the version number of its software to the MPU.
- **Communication** The UM is capable of managing all communication with the Module Rack for up to three external serial devices. After identifying the external monitor or device, the module changes its communication settings for the specific port to match the settings of the external device. The module is capable of determining the protocol based on the detected cable ID.
  The communication timeout period for an external device is 10 seconds.
- **Data Collection** The UM is capable of retrieving VS and waveform data, as well as status, from each external serial device. Additional messages are added for vendor identification to the UM. Trend data for pertinent vital signs is also accumulated and stored.

- **Analysis** The UM examines the vital sign and status data received from the external monitors and devices, and determines if there exists any clinical or technical alarm conditions. Clinical alarm conditions, as well as the enable/disable status for these conditions, are based on the settings received from the MPU.
- **Cable In Detection** For the RS-232 Configuration, the UM is able to detect when the cable to an external device has been inserted or removed.
  The external cable shall be wired with a jumper between the Cable In and Cable Out pins (see Table 1 UM RJ45 Pin Assignments on front panel). On the module processor board, the Cable Out pin shall be connected to ground, while the Cable In pin shall be connected to an I/O pin on the processor and a pull-up resistor. When the cable is inserted, the processor shall detect a logic LO on the Cable In I/O pin This will be accomplished by reading the I/O port to which the Cable In pin is connected.
- **Debug Support** UM Debug support shall be accomplished by attaching a Mennen piggyback XRAY board (PN 551-299-100) to the Processor board via metal posts on the Processor board. In this configuration, the debug executive will be loaded into on board Flash memory instead of the application code.
- **Supply Voltage** Power for the UM is derived from the Module Rack's 12V supply, and the power consumption shall not exceed 4.0W (330mA from +12V).
- **Control Hardware** The Motorola MC68LC302 Low Power Integrated Multi-protocol Processor (IMP), used on all the current modules, is used for the UM. This processor integrates a high speed M68000 processor with multiple communication peripherals. One of these peripherals is the SCC1 communication channel, which supports communication with the module rack. The IMP has an on-chip oscillator and phased locked loop (PLL). A 32.768 khz crystal is used for the IMP clock.
- The flash memory is divided into 2 functional areas: Code Storage and Configuration and Patient Data Storage. A minimum of .5 Mbytes of flash memory (256k x 16 bit words) is provided for program code storage, permitting up to 31 interfaces to be programmed in the module. For Configuration and patient storage, the hardware shall support either 2 Mbit (128k x 8bit x 2) or 4 Mbit (256k x 8 bit x 2) flash size. This storage, built from two 8 bit wide devices, will allow access for both 16 bit and 8 bit read/write operations.
- The MC68LC302 Uart is used to support the serial interfaces to the external devices.
- For the UM, RS-232-to-TTL and TTL-to-RS-232 buffers are provided for interfacing the TTL level components on the board to the external RS-232 signal levels.

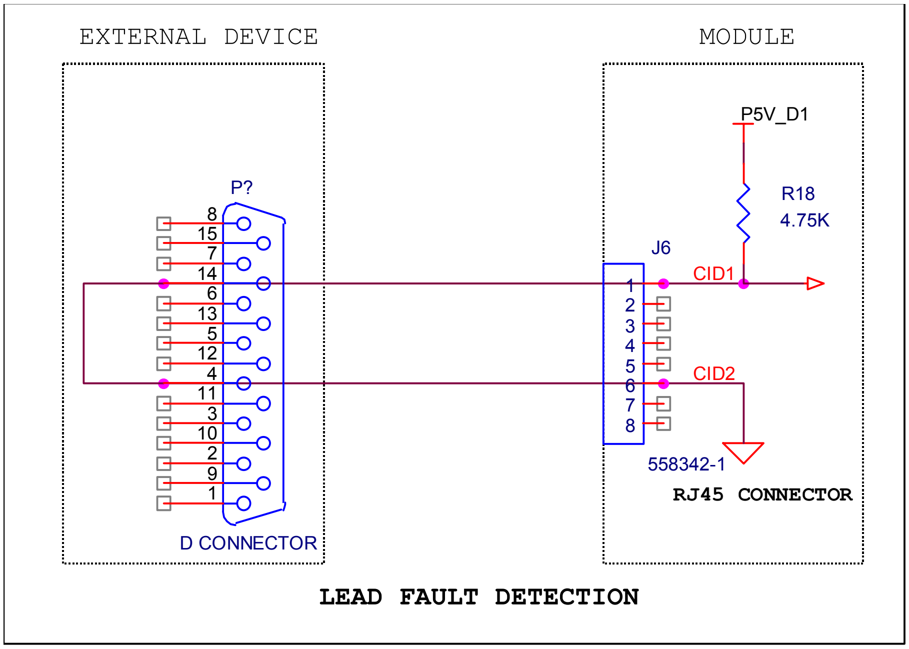
- The module provides isolation between the Envoy and the external instruments. In addition, the connections to each of the external instruments are isolated from each other.
- **Front Panel control and indication** Presently, the front panel push-button is an option. The Front Panel pushbutton is monitored to determine if it has been pressed.
- When a button press has been detected, a button press message for the push-button will be sent to the MPU. The 2 color LED on the front panel is under direct software control of the module. The LED is illuminated green when the associated link is functional, and is illuminated red when there is a link failure.
- **Software Modularity** The software is designed in a modular manner to facilitate the addition of code for new external serial monitors and devices. The code is composed of:
- A common management section, consisting of system timing, detection of external serial data link devices, data analysis, managing the communication with the module rack, front panel push-button and LED management, and real time OS functions such as task definition, queue definition, etc.
- External Device specific code, which sets the communication parameters for the serial port, decodes messages received from external devices, encodes messages transmitted to external devices, detects a technical alarm, and collects VS and waveform data.

The Uniport slim board sends a serial bit stream to the Processing and Storage Block (P&SB) PCB. The P&SB PCB, which contains a powerful communications processor (Motorola MC68LC302) and memory, performs the control, signal processing, communications interface and computation for the Uniport module. Each time the P&SB receives a packet from the Uniport slim board, it separates the samples, stores them locally in its high speed memory, performs some specialized signal processing on the samples and, finally, wraps them in a suitable communications protocol and sends them off to the Module Rack.

In addition to sample processing, the P&SB provides many control lines to various blocks on the Module thereby allowing the hardware to be controlled by the software. The Isolation block electrically isolates the Module from the Module Rack so as to provide safety for the patient and for the operator of the MPU.

As shown at the right side of Figure 2-38 above, the Module is powered by the +12V supply of the Module Rack. Also shown are other signals between the Module Rack and the Module. The Rx and Tx signals provide bi-directional asynchronous communications between the Module and Module Rack.. The RTClk signal generated by the Module Rack allows the Module's real time clock to be synchronized with all the other clocks in the Envoy system.

Lead fault detection is determined by checking the status of J6-1 (signal CID1). When an external cable ties J6-1 (CID1) to J6-6 (CID2), CID1 is pulled to ground, since CID2 is tied to ground. See illustration below.


EXTERNAL DEVICE
MODULE
P?
8
15
7
14
6
13
5
12
4
11
3
10
2
9
1
D CONNECTOR
P5V_D1
R18
4.75K
J6
CID1
CID2
1
2
3
4
5
6
7
8
558342-1
RJ45 CONNECTOR
LEAD FAULT DETECTION

2.17.3 Connectors Description

The front panel contains an RJ45 connector for serial communications with external devices/monitors. Below are the pin designations for the interfaces with an external monitor. Direction is with respect to the module:

Pin #	Title	Direction	Family
1	Cable In detect	Input	HCT
2	Rx	Input	RS-232
3	TX	Output	RS-232
4	Reserved	--	--
5	Gnd	--	--
6	Cable In Ground	--	--
7	RTS	Output	RS-232
8	CTS	Input	RS-232
S1	Shield Ground	--	--
S2	Shield Ground	--	--

Table 1 UM RJ45 Pin Assignments on front panel

- **Ground studs (SLIM - J3, J4)**

  There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

  J4 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack.

- **Module Rack (SLIM – J2)**

  The pin designations for the 20 pin Module Rack connector are shown below in Table 2. Direction of signal names is with respect to the UM.

PIN #	UM	Direction	MR	Active	Logic Family
1	GND	N/A	GND	N/A	
2	GND	N/A	GND	N/A	
3	GND	N/A	GND	N/A	
4	MPRES	→	MPRES	LOW	
5	N/C	→	QRS_SYNC	LOW	
6	N/C	←	OUT_D_SAC	LOW	
7	N/C	←	OUT_CLK_DAC	LOW	
8	TXD_NI	→	RX	LOW	
9	N/C	→	ECG_RX	LOW	
10	RXD	←	TX	LOW	
11	+12V	N/A	+12V	N/A	
12	+12V	N/A	+12V	N/A	
13	+12V	N/A	+12V	N/A	
14	+12V	N/A	+12V	N/A	
15	N/C	→	IN_D_DAC	LOW	
16	N/C	→	IN_CLK_DAC	LOW	
17	N/C	→	IN_SEL_DAC	LOW	
18	RTCLK	←	RTCLK	FALLING EDGE	
19	N/C	←	OUT_SEL_DAC	LOW	
20	N/C	←	ECG_TX	LOW	

Table 2: Pinout of Module Rack Connections – connector in rear of module

2.18 Multiport Module Functional Description

2.18.1 Overview

The Multiport Module, (MM), PN 551-143-000, is a single density module that plugs into the ***Envoy*** Module Rack, and is equipped with three serial data interfaces for asynchronous communication with external monitors and devices having different formats or protocols. The device input is through RJ45 connectors on the front panel. It stores a database of interface code for up to 31 different external devices.

Definitions and Acronyms used in this section:

MPU	Main processor Unit
MR	Module Rack
MM	Multiport Module

Reference document:

- Electrical schematic: 551-243-000

The MM occupies one slot in the Envoy module rack.

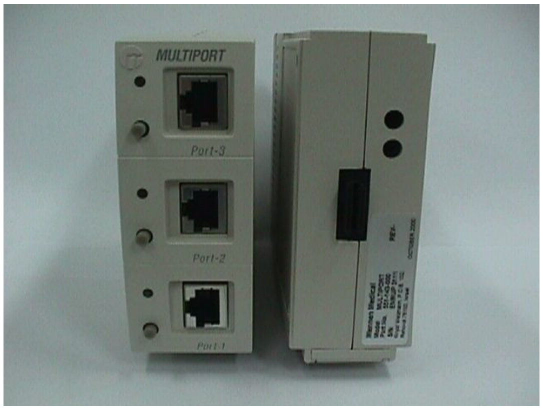


Figure 2-44: Multiport module – front and rear views.

2.18.2 Block Diagram Description

The Multiport Module is used as a generic platform to interface to any external device or monitor equipped with an RS-232 asynchronous communications interface. The block diagram, shown below in *Figure 2-42*, illustrates a "black box" view of the Multiport Module with interfaces to external devices:

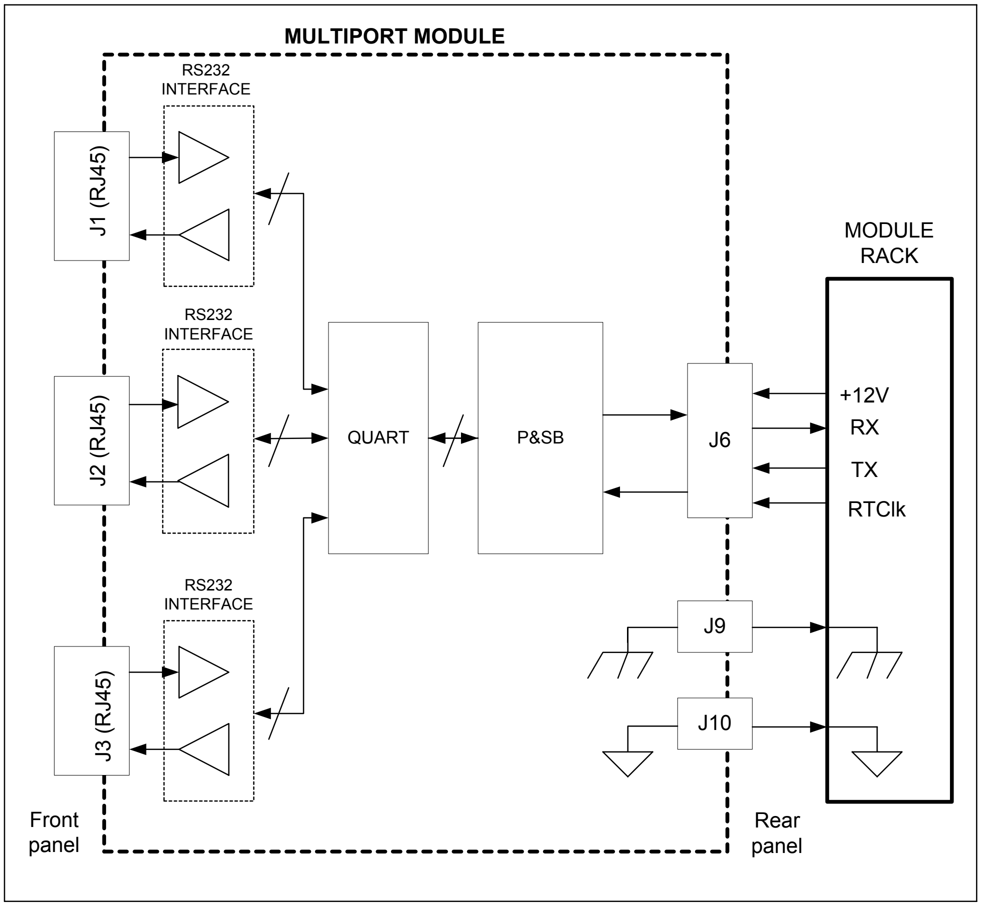

MULTIPORT MODULE
RS232 INTERFACE
RS232 INTERFACE
RS232 INTERFACE
J1 (RJ45)
J2 (RJ45)
J3 (RJ45)
QUART
P&SB
J6
J9
J10
MODULE RACK
+12V
RX
TX
RTClk
Front panel
Rear panel

Figure 2-45: RS-232 Multiport Module Block Diagram - General

The Multiport Module itself, shown within the dotted outline, consists of the following items:

- 1 Printed Circuit Boards (PCB) containing the module electronics The electronics consists of two subassemblies:
  - Processor and storage area containing the M69LC302 processor, FLASH, and RAM memories
  - 3 Isolated serial communication channels containing the RS-232 transmitters, receivers, and opto-couplers for communication with the external devices

- operational software for the Multiport Module
- a front panel containing three RJ45 connectors for the serial interfaces, three 2-color LED's, and 3 pushbuttons
- a module enclosure for housing the above items

As seen above, the Multiport module is capable of acquiring patient waveform and vital sign data from external devices via its serial link interfaces. Following analysis for alarm and instrument fault conditions, this data is packaged according to the NGMS protocol and sent to the MPU for further analysis and display. Besides providing the +12V power source for the Multiport Module, the Module Rack provides the following signal interfaces:

- **Rx/Tx** Asynchronous communication with the MPU. These lines are used for transferring waveforms and vital signs from the Multiport Module to the MPU, as well as for passing control signals (e.g. parameters) from the MPU to the Multiport Module. (The Module Rack's involvement in this signal is to combine the communication channels from all the modules into a single line connected to the MPU. Because of the higher data density this single line connection is done at a higher speed and goes through the Hi-speed Comm block in the MPU.
- **RTClk** Synchronization pulse for real time clock. Originating in the System Clock in the MPU, this signal periodically calibrates all the Module clocks, ensuring that they are all set equal to the system time.

Features:

- **External Device Identification** The identity of each external device connected to the Multiport Module is received from the MPU. Upon receipt of this information, the Multiport Module changes the communication parameters of the affected port to match those of the external device.
- **Module Management** The Multiport Module is capable of performing the module management and identification functions with the Module Rack. The handshaking includes vendor definition sent by the MPU. The Multiport Module is capable of performing the module management and identification functions in accordance with the Module Rack ICD. Messages are added to inform the Multiport Module of the vendors attached to a specific serial port. The Multiport Module also reports the version number of its software to the MPU.
- **Communication** The Multiport Module is capable of managing all communication with the Module Rack for up to three external serial devices. Following user selection, the MPU provides information to the Multiport Module on the connected external devices, The Multiport Module then changes its communication settings for the affected port to match the settings of the external devices.

The communication timeout period for an external device is approximately 10 seconds. If no communication has been received for this period of time, the Multiport Module will issue a No Comm alarm to the MPU.

- **Data Collection** The Multiport Module is capable of retrieving VS and waveform data, as well as status, from each external serial device. Trend data for pertinent vital signs is also accumulated and stored.
- **Analysis** The Multiport Module examines the vital sign and status data received from the external monitors and devices, and determines if there exists any clinical or technical alarm conditions. Clinical alarm conditions, as well as the enable/disable status for these conditions, are based on the settings received from the MPU.
- **Cable In Detection T**he Multiport Module is able to detect when the cable to an external device has been inserted or removed. The external cable shall be wired with a jumper between the Cable In and Cable Out pins (see Table 1 Multiport Module RJ45 Pin Assignments on front panel). On the module processor board, the Cable Out pin shall be connected to ground, while the Cable In pin shall be connected to an I/O pin on the processor and a pull-up resistor. When the cable is inserted, the processor shall detect a logic LO on the Cable In I/O pin This will be accomplished by reading the I/O port to which the Cable In pin is connected.
- **Debug Support** Multiport Module Debug support shall be accomplished by loading XRAY debugger executive into the board Flash memory instead of the application code. The target software will communicate with the host software executing on a PC via SCC2 of the 68LC302 processor on the Multiport Module PCB.
- **Supply Voltage** Power for the Multiport Module is derived from the Module Rack's 12V supply, and the power consumption shall not exceed 4.0W (330mA from +12V).
- **Control Hardware** The Motorola MC68LC302 Low Power Integrated Multi-protocol Processor (IMP), used on all the current modules, is used for the Multiport Module.
- This processor integrates a high speed M68000 processor with multiple communication peripherals. One of these peripherals is the SCC1 communication channel, which supports communication with the module rack. The IMP has an on-chip oscillator and phased locked loop (PLL). A 32.768 khz crystal is used for the IMP clock.
- The flash memory is divided into 2 functional areas: Code Storage and Configuration and Patient Data Storage. A minimum of .5 Mbytes of flash memory (256k x 16 bit words) is provided for program code storage, permitting up to 31 interfaces to be programmed in the module. For Configuration and

patient storage, the hardware shall support either 2 Mbit (128k x 8bit x 2) or 4 Mbit (256k x 8 bit x 2) flash size. This storage, built from two 8 bit wide devices, will allow access for both 16 bit and 8 bit read/write operations.

- A Startech 16C554 Quad Asychronous Receiver/Transmitter Integrated Circuit shall be used to support the serial interfaces to the external devices. Three of the four available serial communication channels will be used for the 3 external serial interfaces.
- The module provides isolation between the ***Envoy*** and the external instruments. In addition, the connections to each of the external instruments are isolated from each other.
- **Front Panel control and indication** A front panel push-button is provided for each of the 3 interfaces. The Front Panel pushbutton is monitored to determine if it has been pressed. The function accomplished via the use of this button will be specific to each interface.
- The 2 color LED on the front panel is under direct software control of the module. The LED is illuminated green when the associated link is functional, and is illuminated red when there is a technical failure.
- **Software Modularity** The software is designed in a modular manner to facilitate the addition of code for new external serial monitors and devices. The code is composed of:
- A common management section, consisting of system timing, detection of external serial data link devices, data analysis, managing the communication with the module rack, front panel push-button and LED management, and real time OS functions such as task definition, queue definition, etc.
- External Device specific code, which sets the communication parameters for the serial port, decodes messages received from external devices, encodes messages transmitted to external devices, detects a technical alarm, and collects VS and waveform data.

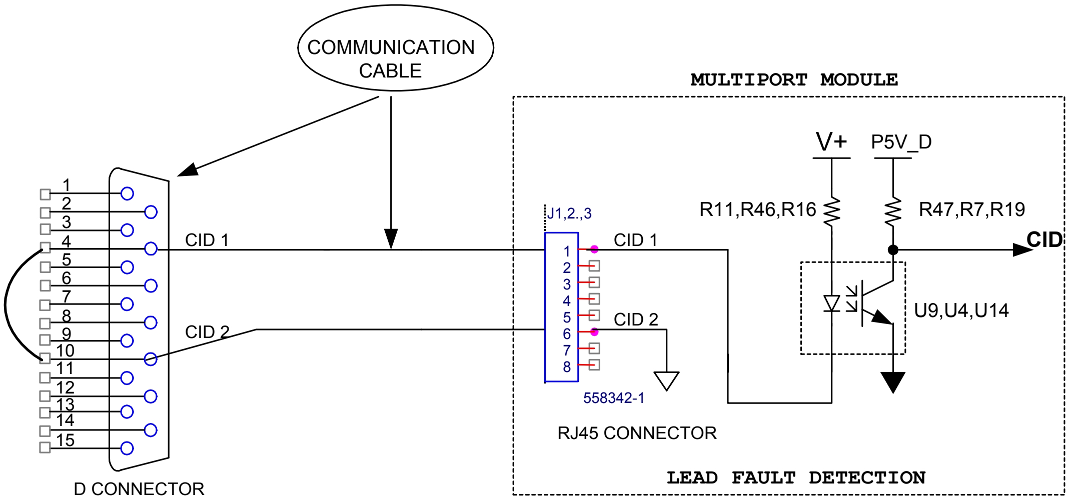
Operation:

The Multiport Module Processing PCB, which contains a powerful communications processor (Motorola MC68LC302) and memory, performs the control, signal processing, communications interface and computation for the Multiport Module. The processor receives packets from the isolated serial channel subassembly. Upon receipt of the data , the processor separates the samples, stores them locally in its high speed memory, performs some specialized signal processing on the samples and, finally, wraps them in a suitable communications protocol and sends them off to the Module Rack.

In addition to sample processing, the processor provides many control lines to various blocks on the Module thereby allowing the hardware to be controlled by the software.

The isolated serial channel subassemblies electrically isolates the Module from the external devices so as to provide safety for the patient and for the operator of the MPU.
As shown at the right side of Figure 2-42 above, the Module is powered by the +12V supply of the Module Rack. Also shown are other signals between the Module Rack and the Module. The Rx and Tx signals provide bi-directional asynchronous communications between the Module and Module Rack.. The RTClk signal generated by the Module Rack allows the Module's real time clock to be synchronized with all the other clocks in the Envoy system.

Cable out detection is determined by checking the status of J6-1 (signal CID1). When an external cable ties J6-1 (CID1) to J6-6 (CID2), CID1 is pulled to ground, since CID2 is tied to ground. See illustration below:


COMMUNICATION CABLE
MULTIPORT MODULE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
CID 1
CID 2
D CONNECTOR
J1,2.,3
1
2
3
4
5
6
7
8
558342-1
RJ45 CONNECTOR
CID 1
CID 2
V+
P5V_D
R11,R46,R16
R47,R7,R19
CID
U9,U4,U14
LEAD FAULT DETECTION

2.18.3 Connectors Description

The front panel contains an RJ45 connector for serial communications with external devices/monitors. Below are the pin designations for the interfaces with an external monitor. Direction is with respect to the module:

Pin #	Title	Direction	Family
1	Cable In detect	Input	--
2	Rx	Input	RS-232
3	TX	Output	RS-232
4	Reserved	--	--
5	Gnd	--	--
6	Cable In Ground	--	--
7	RTS	Output	RS-232
8	CTS	Input	RS-232
S1	Shield Ground	--	--
S2	Shield Ground	--	--

Table 5 Multiport RJ45 Pin Assignments on front panel

Ground studs (J3, J4)

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J4 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack.

Module Rack Connector (J2)

The pin designations for the 20 pin Module Rack connector are shown below in Table 6. Direction of signal names is with respect to the Multiport Module.

Pin #	UM	Direction	MR	Active	Logic Family
1	GND	n/a	GND	n/a	
2	GND	n/a	GND	n/a	
3	GND	n/a	GND	n/a	
4	MPRES	→	MPRES	LOW	
5	n/c	→	QRS_SYNC	LOW	
6	n/c	←	OUT_D_DAC	LOW	
7	n/c	←	OUT_CLK_DAC	LOW	
8	TXD_NI	→	RX	LOW	
9	n/c	→	ECG_RX	LOW	
10	RXD	←	TX	LOW	
11	+12V	n/a	+12V	n/a	
12	+12V	n/a	+12V	n/a	
13	+12V	n/a	+12V	n/a	
14	+12V	n/a	+12V	n/a	
15	n/c	→	IN_D_DAC	LOW	
16	n/c	→	IN_CLK_DAC	LOW	
17	n/c	→	IN_SEL_DAC	LOW	
18	RTCLK	←	RTCLK	FALLING EDGE	
19	n/c	←	OUT_SEL_DAC	LOW	
20	n/c	←	ECG_TX	LOW	

Table 6 Pinout of Module Rack Connections – connector in rear of module

2.19 Four Channel EEG Module (551-138-000)

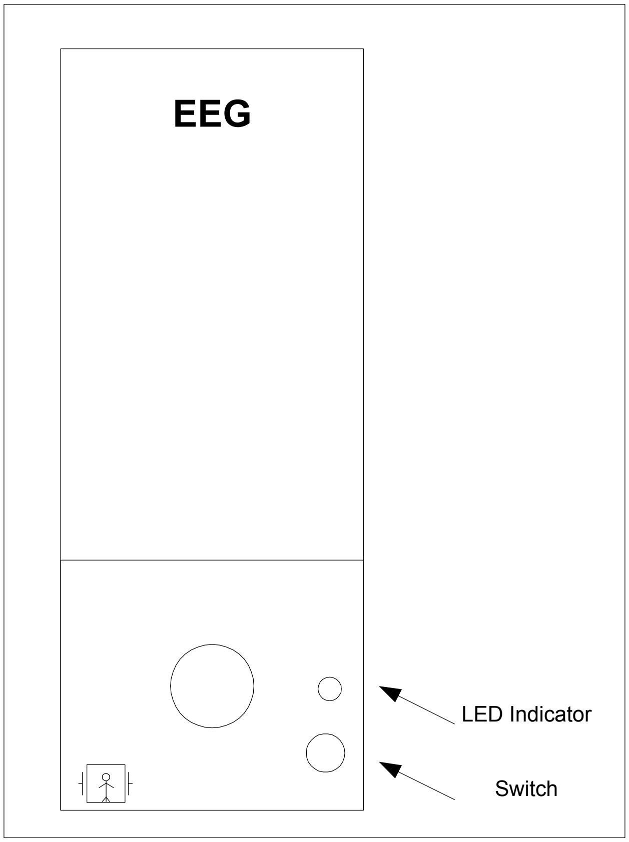


Figure 2-46: EEG Module – Front Panel

2.19.1 Overview

The Envoy EEG module uses a five-electrode configuration to sense the spontaneous bio-electric potentials associated with the activity of the brain. The four EEG channels are filtered and amplified for presentation and recording of the EEG waveforms on the Envoy display. The EEG module does not produce any numeric data or alarms. EEG waveforms are identified by their frequency. The frequency is determined by the number of cycles per second or Hz. Common EEG waveforms are identified by name and the characteristic frequency

- see Table 1 below.

Intended Use of the Envoy EEG module:

Note: The EEG module is NOT intended for use on infants.

The Envoy EEG module can monitor up to 4 differential EEG channels. The Envoy EEG module can be used as an indicator of brain damage or cerebral activity. The

EEG module is commonly used to monitor the cerebral activity of patients who have suffered serious head injury. Its primary purpose is to determine the need for more detailed EEG recordings. The EEG module is not a replacement for a comprehensive multi-channel (16 to 36 or more) EEG diagnosis by a neurology specialist. Since four channels are displayed simultaneously, qualitative assessments can be made regarding right and left hemispheric activity. EEG monitoring is continuous and in real time.

Signal Frequency Band

Alpha 8.0 – 12.0 Hz

Beta 13.0 Hz and above

Delta 0.5 – 3.5 Hz

Theta 3.5 – 7.5 Hz

The EEG module is supplied with either a 5 lead cable kit (P/N 551-306-128) with miniclips at the end of each lead; or with an EEG 5 lead cable without the ECG leads (P/N 551-306-129) - the latter cable is used with EEG electrodes that consist of lead wires and DIN protected connectors. The 5 Lead EEG cable is to be used exclusively with the Mennen Medical Ltd. Envoy Patient Monitor and includes protection against defibrillation. Use only original cable and lead wires. This cable is not compatible with other Mennen Medical monitors, nor other vendor devices.

WARNING!!! Cables and wires should not be immersed in liquid.

Do not expose the cable to strong ultra-violet radiation.

CAUTION! Cleaning - Clean with a soft cloth, using mild soap or detergent. Wipe with a clean damp cloth and dry with a clean dry cloth. CAUTION! Preventive Care - Keep the cable clean at all times. Prevent sharp bending of the cable or the wires. Check the cable and wires for any sign of deterioration, and discard if necessary. Changing of individual wires or the wire set, should be performed by an authorized service person only. The input connector of the EEG cable has a green plug that fits into the green socket of the EEG module.

The leads are marked as follows:

A - Black
B - Red
C - Brown
D - Green
E - White

Warnings and Precautions: References

WARNING!!! To prevent electrical shock hazard, only qualified service personnel should open the module and/or the Envoy patient monitor. To avoid EMC interference, do not use a cellular telephone or portable transmitter in the vicinity of the monitored patient.

CAUTION! Electrostatic potential may interfere with EEG recording. To prevent electrostatic interference, we recommend that you use an anti-static floor and anti-static bed sheets for EEG monitoring.

CAUTION! The 4 channel EEG provided by the Envoy EEG module is to be used as an indicator of cerebral function only, and is not a replacement for an extensive EEG study with a multi-channel (e.g. 16-32 channel) Electroencephalograph.

The user is referred to the following chapters in the Envoy Operating Manual before using the EEG module:

Chapter 2 - Warnings and Precautions

Note: Chapter 2 refers to ECG, but is relevant and applies also to EEG measurement.

EEG - 4 Channel Envoy Operating Manual

Chapter 4 - Installation and Setup

Chapter 5 - Maintenance and Cleaning

Note: Refer to the section on page 4-3 of Chapter 4 concerning the grounding of the system; for the sake of convenience, the section appears below:

"To protect the patient and hospital personnel, the Envoy system must be grounded. Accordingly, the system is equipped with a detachable 3–wire cable which grounds the instrument to the power line ground (protective earth) when plugged into an appropriate 3–wire receptacle. If a 3–wire receptacle is not available, consult the hospital electrician. Do not use a 3–wire to 2–wire adapter with this instrument. If the processor and the display module are set up together, connect the grounded wire to the equipotential grounding terminal on the display. If the processor and the display module are separated, connect the grounding wire to the display as well as to the processor. If it is not evident from the instrument specifications whether a particular instrument combination is hazardous or not, for example due to summation of leakage currents, the user should consult the manufacturers concerned or an expert in the field to ensure that the necessary safety of all instruments concerned will not be impaired by the combination. The module data cable includes a grounding shield which automatically provides grounding protection between the module rack and the main processing unit".

2.20 Spirometry Module (551-137-000)

2.20.1 Overview

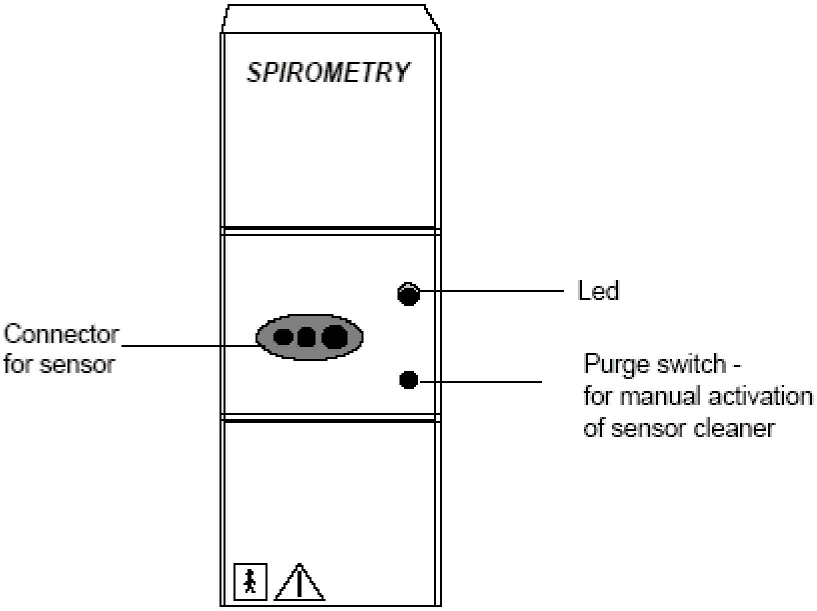


Figure 2-47. SPIROMETRY Module – Front Panel

The Spirometry module (P/N 551-137-00) of the Mennen Medical Envoy patient bedside monitor, enables monitoring the flow, volume, airway pressure and lung mechanic parameters. The Spirometry module is intended for use in the hospital clinical environment only (e.g. in the RICU). The module is used for the continuous monitoring of mechanically ventilated **adult** and **pediatric** patients; or for **adult** and **pediatric** patients able to breathe spontaneously. In both cases, breathing is via a tracheal tube or mask. The module should be used only for patients with tidal volumes greater than 100 ml.

The basic application of the Spirometry module is to provide a display of the Respiratory Mechanics waveforms and loops on the Envoy patient monitor, if they are not displayed on an external Ventilator. In addition, the Envoy can store the Spirometry parameters and clinical data in “Charts” and “Trends” together with the patient data of other vital signs measured by the Envoy monitor. The user can thereby determine the correlation between the respiration mechanics data and the data of other vital signs.

Note: *The user has the choice of activating or disabling alarms for the Spirometry module. The user can set the alarm limits and the alarm response via the alarm limits and the alarm response panels of the Spirometry module.*

Spirometry is measured by means of a device called “Pneumotachograph” that converts airflow into pressure gradient and enables the recording of airflow to and from the lungs. For continuous Spirometry monitoring, we use a disposable plastic tube with some resistance to air flow. The pressure drop on the resistance is related to the air flow. The air volume signal is received by integration of the air flow signal. In parallel, also the airway pressure is measured in the mouth side of the Pneumotachograph**.**

The Envoy Spirometry module uses a disposable Pneumotachograph sensor that is connected to the module via two air tubes.

There are two transducers in the module:

1. A differential transducer that measures the pressure drop on the Pneumotachograph and

2. Another transducer that measures the airway pressure.
For long term monitoring, the Envoy uses a built in Purge pump for periodic removal of water droplets collected in the two air tubes.

Principles of Operation

The Envoy Spirometry module uses OEM flow sensor technology developed by CPT; this technology is based upon a fixed orifice, differential pressure approach to flow measurement. The airway adapter flow sensor creates a slight resistance to the patient’s respiratory flows. This resistance causes a pressure drop that is relative to the flow rate. Both this pressure drop and the overall airway pressure are measured to calculate the numeric parameters and create the graphics loops and waveforms. An internal barometric pressure transducer automatically compensates for ambient barometric pressure and altitude changes.

The pressure transducers are automatically calibrated without user intervention. This automatic calibration briefly, less than one second, interrupts patient monitoring. This function is needed due to changes in monitor temperature and position. The Envoy Spirometry module employs a pump and purge system to keep the tubing clear, allowing for continuous usage. The system is entirely free of any user calibration.

The Spirometry module produces three waveform signals:

- Air flow
- Air volume
- Airway pressure

The module measures a set of numeric parameters that evaluate the respiration function. The module monitors respiratory mechanic continuously in both spontaneous respiration and during artificial ventilation.

WARNING!!! *Read the following chapters of the Envoy Operating Manual before using the Envoy Spirometry module:*

Chapter 2: Warnings and Precautions

Chapter 4: Installation

Chapter 5: Maintenance and Cleaning

Envoy Operating Manual Spirometry Mennen Medical 27-3

In particular, note the following **Caution** and ***Warnings***:

Caution: Federal law restricts this device to sale by or on the order of a physician.

Warning: Do not use this device in the presence of flammable anesthetics.

Warning: Do not use this device in the presence of magnetic resonance imaging,

MRI, equipment.

Warning: The Envoy Spirometry module is intended to be used for the continuous monitoring of pulmonary mechanics of **adult** and **pediatric** patients; it is not intended to replace a comprehensive diagnosis of pulmonary function.

Warning: To prevent electrical shock hazard, only qualified service personnel should open the module and/or the Envoy patient monitor.

Warning: Do not submerse the Envoy Spirometry module at any time. Appropriate cleaning is done by wiping the unit down with disinfectant solution.

Warning: Use of the Envoy Spirometry module in the presence of high concentrations of oxygen, helium-oxygen mixtures and anesthetic agents may cause errors in the reported flow measurement.

Warning: The flow sensor/airway adapter is disposable and for ***single patient use only.***

Caution: The Envoy monitor can display respiration numeric parameters from the Spirometry module or from a UIM (Universal Interface Module) that interfaces with an external OEM Ventilator. If both the Spirometry module and the Ventilator interface are activated simultaneously, then the Spirometry waveforms and loops are generated by the Spirometry module, while the numeric parameters come from the Ventilator. In this case, the table of parameters is marked as “Vent” and not as “Spiro”.

Monitor and Patient Connection

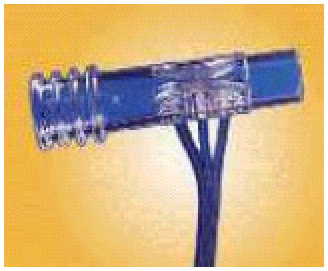


Figure 2-48: Flow sensor/air adapter

A single-patient, disposable flow sensor, 15 mm airway adapter made of plastic, connects the patient to the Envoy Spirometry module. Mennen Medical uses an OEM sensor with the trade name: EZ-Flow™ flow sensor.

Note: The term "flow sensor" is used interchangeably with "airway adapter".

The Spirometry sensor depicted below consists of the Pneumotachograph and a triple tube that connects the sensor to the module.

The sensor is classified as a fixed orifice, differential pressure device. The EZ-Flow™ flow sensor is connected in series to the ventilation tubing and the patient tubing; and is joined to the module via a set of three tubes. There is no conductive connection between the patient and the Envoy Spirometry module.

Flow sensor to monitor

Connect the sensor tubing to the Spirometry module before placing the airway adapter in the patient ventilation circuit. The end of the triple lumen tube of the sensor fits into the triple connector of the module. Insert the blue tube in the larger port for proper tubing placing. Once the tubing is aligned correctly, firmly press tubing into the connector.

Flow Sensor to patient circuit

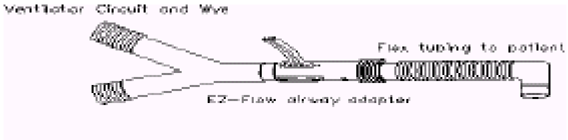


Figure 2-49: Airway adapter/Flow sensor to patient circuit

- ***To start monitoring the pulmonary mechanics (Spirometry) of a ventilated patient***

1. Disconnect the flex tube of the patient from the "Y" tube of the ventilator

2. Insert the flow sensor between the patient tube and the ventilator tube

3. Orient the tubing of the airway adapter upward in order to minimize moisture and secretions in the adapter and tubing as shown in the figure below:

Figure 2-21: Airway adapter/Flow sensor to patient circuit

CAUTION! *During the insertion of the flow sensor into the breathing circuit, the patient is not ventilated. Perform this procedure as quickly as possible.*

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and on	flashes on breathing pulses
LED is red and blinking	
LED is red and on	Technical fault (i.e., cable connected incorrectly)

2.20.2 Block Diagram Description

Following are Spirometry module major blocks:

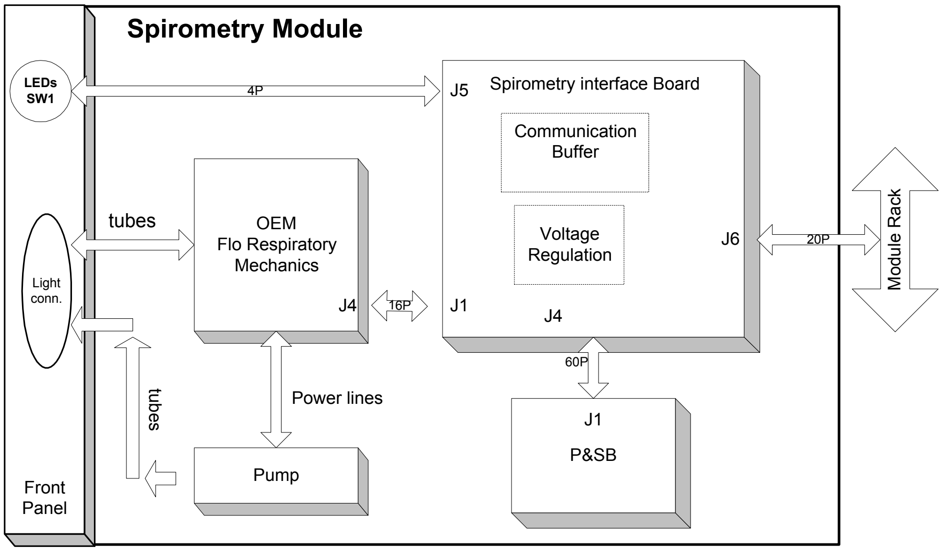

Spirometry Module
LEDs
SW1
4P
J5
Spirometry interface Board
Communication
Buffer
Voltage
Regulation
J6
20P
Module Rack
tubes
OEM
Flo Respiratory
Mechanics
J4
16P
J1
J4
Light
conn.
60P
tubes
Power lines
J1
P&SB
Pump
Front
Panel

Figure 2-502. Spirometry Module - Block Diagram

The Spirometry module is composed of three boards:

1. Spirometry interface.
2. P&SB.
3. OEM Airway Flow Respiratory Mechanics Module.

All three blocks are a stand alone PCB's and provide the following major functions:

The INTERFACE board provides the interfaces to the OEM unit, P&SB unit and the Module Rack through the described OEM, P&SB, M.R. connectors.

The power supply system is also implemented on the INTERFACE board.

The Isolation block electrically isolates the Module from the Module Rack so as to provide safety for the patient and for the operator of the BCU. The isolation limits the maximum current through the patient cable to a safe level.

As shown at the right side of the figure, the Module is powered by the +12V supply of the Module Rack to PT510 switch regulator that produces the 5 volts requires for the P&SB module and the OEM board.

The module requires no isolation barrier from the patient – due to that it is not an applied part connection - the flow sensors that are connected to the patient are made from plastic, so no optocouplers and DC/DC

The communication signal from the OEM module are 3.3V so the Interface board also provides the voltage conversion to 5V signals in order to communicate with the MC68302 in the P&SB board. This is done by buffer 74LCX07.

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see section 3.4 P&SB Module Functional Description).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed:	up to 19200 bps
Physical layer:	TTL/CMOS levels
Data Link layer:	Serial, full duplex, asynchronous point-to-point link.

2.20.3 Connectors Description

The EtCO2 Module includes the following connectors:

- J2 & J3 – GND connectors
- J6 – Connector to module rack.
- J1 – Connector to OEM.
- J5- Flex Connector.
- J4 – P&SB connector.

J2 and J3 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J2 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack

J6 connector to the module rack

PIN	Signal *	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Module present notification signal. Notifies the module rack that this module is connected, by transmitting “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power

PIN	Signal *	Direction	Description
15	NC	-	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.

PIN	Signal *	Direction	Description
20	NC	-	-

- Direction related to EtCO2 interface

J3 – OEM Connector:

PIN	Signal *	Direction	Description
1	Pump on	In	3.3V CMOS level active high
2	Pump PWM	In	3.3V variable duty cycle
3	GND		
4	Power in	In	5VDC
5	Power off	In	TTL level system power down
6	NC		
7	DIGTX	Out	3.3V serial transmit line
8	NC		
9	DIGRX	In	3.3V serial receive line
10	NC		
11	NC		
12	Power	In	5VDC
13-16	NC		

J2 optional connector to the flex keypad and LED

PIN	Signal	Direction	
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

Spirometry test Device

The Spirometry test device, consists of three parts:

- Modified Ambu ventilator balloon
- Female to Female tube
- Male outlet tube

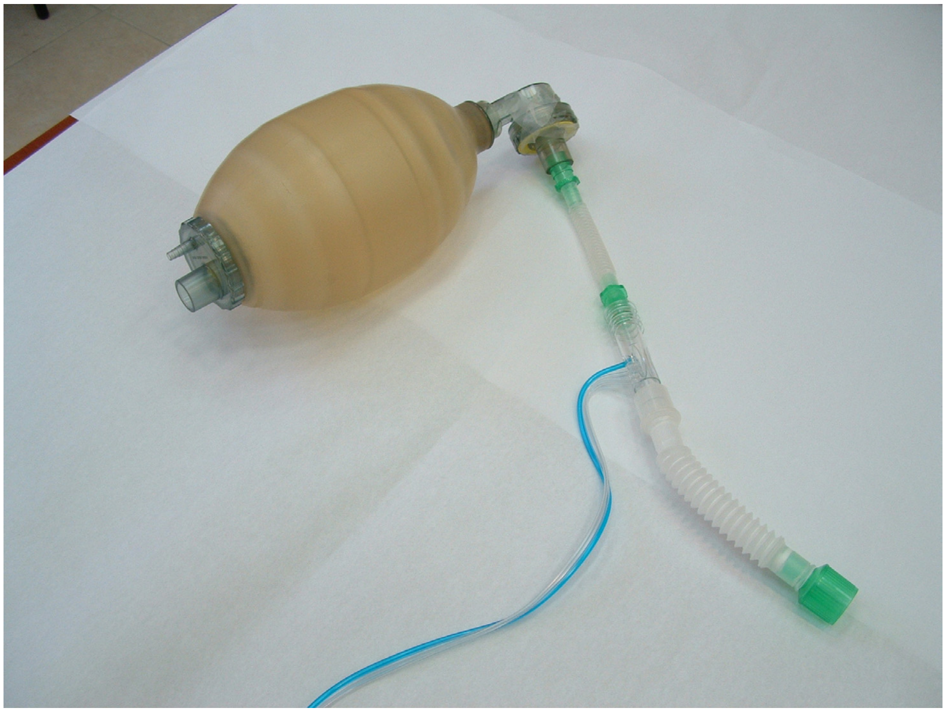
The Ambu ventilator consists of a balloon (Silicon Bag) which incorporate elastic elements that cause the balloon to open up after it is manually compressed. In its standard use it serves as a manual ventilator. Upon pressing the balloon the outlet patient valve is opened and air is compressed into the patients' airway. Upon release of the balloon, the outlet valve is closed, the inlet valve is opened and the balloon returns to full volume with air coming from the inlet valve. To prevent over-pressure, when the balloon is compressed, there is an additional Over-pressure outlet valve that will release air from the balloon when over-pressure occurs.

The Ambu modification included:

- Closing of inlet valve
- Removing the Outlet valve
- Closing of over-pressure outlet valve

After the modification the balloon has one opening that serve as outlet and inlet, with no valves. This is a simulation of the lungs that consist of a balloon with open airways through the mouth and nose.

The modified Ambu is thus a simulation of the lungs.



2.21 *Patient Preparation Checklist*

2.21.1 Electrode Types

The type of electrode used with the Envoy EEG module (P/N 551-138-000) may vary with the application and the circumstances of individual cases. Electrodes with wires should have a DIN protected plug. The patient cable should be taped to the skin to provide strain relief. The advantage

of this type of electrode is the rapidity of attachment and the intimate contact with subcutaneous tissue. Pre-gelled disposable electrodes are attached directly to the skin of the patient. The advantage of this type of electrode is the ease of attachment to the patient. The four display

channels are differential, with the following channels:

(A-B), (B-C), (C-D). (D-E).

Two examples of recommended locations that provide left to right side signal comparison appear below:

Note: We recommend that you use a montage that allows two of the four channels to be on the left hemisphere; and the other two channels to be on the right hemisphere.

Frontal A = F7 B = F3 C = Fz D = F4 E = F8

Occipital A = T5 B = P3 C = Pz D = P4 E = T6

The EEG cable allows the user to use either electrodes attached to the scalp without wires; or electrodes equipped with a wire that has a DIN protected plug.

The LED indicator on the front panel of the module indicates the functional status of the module as follows:

Status	Indication
LED is green and on	Module is fully functional and monitoring
LED is red and blinking	
LED is red and on	Technical fault (i.e., cable connected incorrectly)

2.21.2 lock Diagram Description

The EEG module includes basic boards:

3. Interface board which includes the EEG amplifier with isolation barrier.
4. P&SB board for processing.

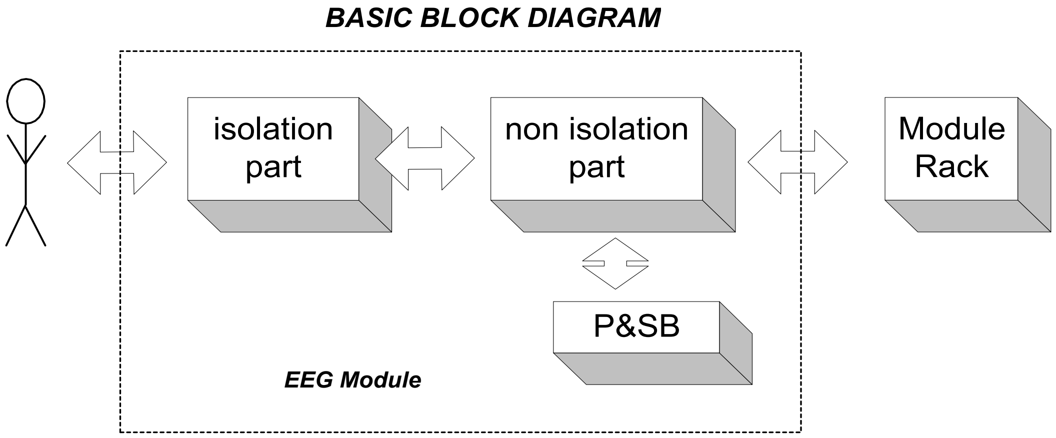


Figure 2-51. EEG Module - Block Diagram

The Processing and Storage Block (P&SB) consists of a communications processor and memory, together perform local data storage and protocol translation from low level protocol, to high level NGMS protocol (for more details see section *3.4 P&SB Module Functional Description*).

The communication between the P&SB circuit and the module rack has the following characteristics:

Speed: up to 19200 bps

Physical layer: TTL/CMOS levels

Data Link layer: Serial, full duplex, asynchronous point-to-point link.

The interface board consists of the following:

- 12 V DC which supply from the MR.
- 5 V DC for the digital circuits which supply from switch regulator.
- DC/DC for isolation.

Connectors Description

The EtCO2 Module includes the following connectors:

- J9 & J10 – GND connectors
- J6 – Connector to module rack.
- J2- Flex Connector.
- J1 – BDM Connector

J9 and J10 ground studs

There are two steel ground studs in each module rack slot. When the module is plugged into the slot, these studs plug into two corresponding holes in the module's rear cabinet and thereby guide the 20-pin connector into its mate. Aside from the mechanical purpose, these studs also facilitate *live insertion.* Live insertion allows modules to be plugged in and out of the system while the system is live; i.e. there is no need to turn off the system. Because the ground studs are much longer than the module rack connector, they plug into their corresponding mates on the module before the module rack connector plugs into its mate on the module rack. Only once the module is "grounded" is the power applied.

J2 connects first to chassis ground of module rack, to provide path for voltage transients to dissipate to earth (mains) ground. Then J3 connects to the GND of module rack to provide reference for signals between the module and module rack

J6 connector to the module rack

PIN	Signal *	Direction	Description
1	GND	Output	Power
2	GND	Output	Power
3	GND	Output	Power
4	MPres (GND)	Output	Module present notification signal. Notifies the module rack that this module is connected by transmitting “0”.
5	NC	-	QRS synchronization signal from ECG module on module rack.
6	NC	-	Input data signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
7	NC	-	Input clock signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
8	TXD-NI	Output	Output of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
9	NC	-	-
10	RXD-NI	Input	Input of asynchronous communication channel between EtCO2 module and module rack (speed up to 19.2kBit/s).
11	P12V	Input	Power
12	P12V	Input	Power
13	P12V	Input	Power
14	P12V	Input	Power

PIN	Signal *	Direction	Description
15	NC	-	Output data of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
16	NC	-	Output of clock signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
17	NC	-	Output of select signal of serial communication channel from the module to the DAC (in module rack) to produce real time analog signal.
18	RTCLK-NI	Input	Input of real time synchronization signal, rising edge defines synchronization request.
19	NC	-	Input select signal of serial communication channel from module rack to produce ECG/Respiration real time analog signal.
20	NC	-	-

J2 optional connector to the flex keypad and LED

PIN	Signal	Direction	Description
1	GND	Output	Power
2	LED1-G	Output	Green LED
3	LED1-R	Output	Red LED
4	SW1	Input	Switch

3.1 Overview

The basic ***Envoy*** system (see figure below) usually consists of more than one ***Envoy*** bedside monitor, recorder, laser printer and local area network (LAN).

The installation includes the following stages:
Site survey

Unpacking and inspection

Setting up the basic system

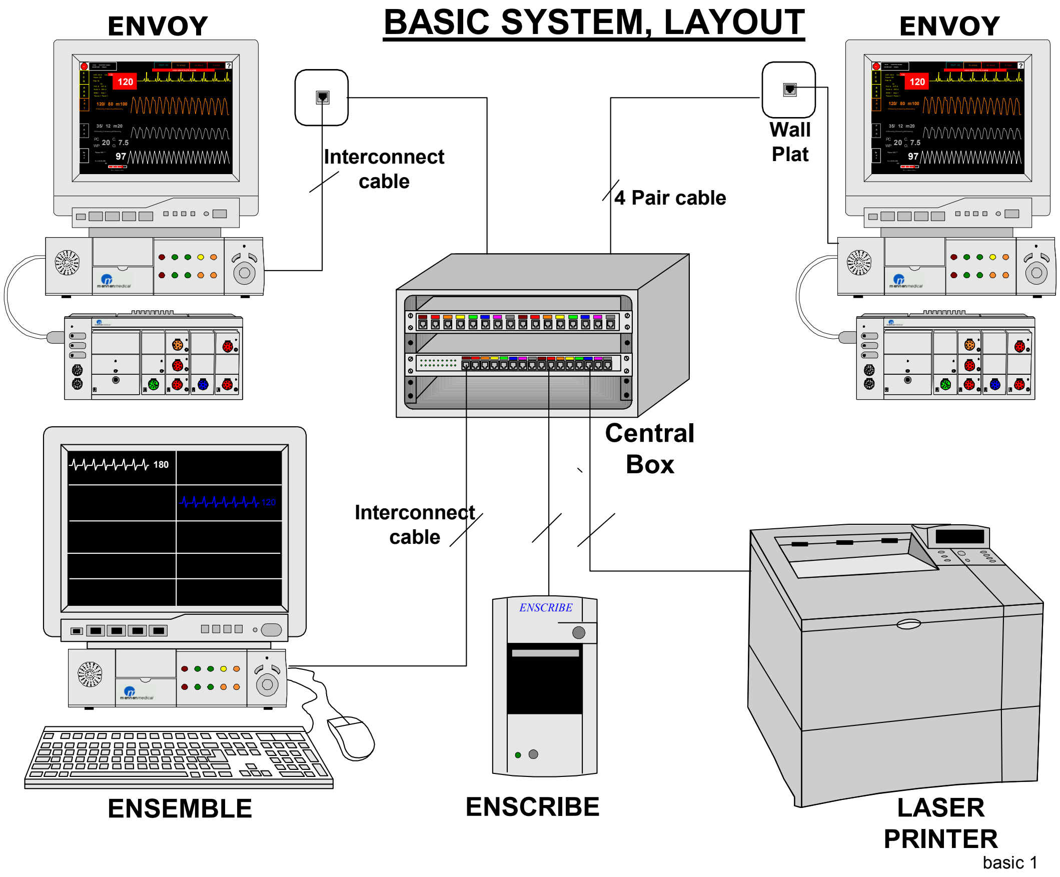

BASIC SYSTEM, LAYOUT
ENVOY
ENVOY
Interconnect cable
Wall Plat
4 Pair cable
Central Box
Interconnect cable
ENSCRIBE
ENSEMBLE
ENSCRIBE
LASER PRINTER
basic 1

*Figure 3-1. **Envoy** System Basic Setup*

In addition, various options exist for mounting the ***Envoy*** bedside monitor – see Section 3.5.5 on page 20.

3.2 Safety Precautions

Before installing the system, you must consider the following safety precautions:

System grounding

Equipotential grounding

Electrosurgery, diathermy and defibrillation protection

Monitor Mounting

Accidental wetting of the equipment

Patient connections

General hazards

3.2.1 Grounding the System

To protect patients and hospital personnel, the ***Envoy*** system must be grounded. Accordingly, the system is equipped with a detachable 3–wire cable which grounds the instrument to the power line ground (protective earth) when plugged into an appropriate 3–wire receptacle. If a 3–wire receptacle is not available, consult the hospital electrician.

Warning! *Do not use a 3–wire to 2–wire adapter with this instrument.*

If the MPU and the display screen are set up together, connect the grounded wire to the equipotential grounding terminal on the display. If the MPU and the display screen are separated, connect the grounding wire to the display as well as to the MPU.

Warning! *If it is not evident from the instrument specifications whether a particular instrument combination is hazardous or not. For example, due to summation of leakage currents, the user should consult the manufacturers concerned or an expert in the field to ensure that the necessary safety of all instruments concerned will not be impaired by the combination.*

Note*: The module data cable includes a grounding shield, which automatically provides grounding protection between the module rack and the MPU.*

3.2.2 Equipotential Grounding

Protection class 1 instruments are already included in the protective grounding (protective earth) system of the room by way of grounding contacts in the power plug. For internal examination on the heart or the brain, the ***Envoy*** must have a separate connection to the equipotential grounding system.

One end of the equipotential grounding cable (potential equalization conductor) is connected to the equipotential grounding terminal on the instrument's rear panel and the other end to one point of the equipotential grounding system. The equipotential grounding system assumes the safety function of the protective grounding conductor if ever there is a break in the protective grounding system.

Examinations in or on the heart (or brain) should only be carried out in medically used rooms incorporating an equipotential grounding system.

Check each time before use that the instrument is in perfect working order. The cable connecting the patient to the instrument must be dry and clean.

When performing examinations in or on the heart (or brain), the conductive parts of electrodes and associated connectors, including the neutral electrode, should not contact other conductive parts including earth.

3.2.3 Electrosurgery, Diathermy and Defibrillation Protection

Neither electrosurgery and diathermy instruments nor defibrillation will damage the monitor. If the correct electrodes are used and applied according to the manufacturer's instructions, the screen display will recover within 10 seconds of defibrillation. The modules have floating inputs are defibrillator-proof.

Warning! *Do not touch the patient, bed or instrument during defibrillation.*

3.2.4 Mounting of Monitors

Mount the monitors on Mennen Medical wall mounts. Different wall mounts or shelves have to be checked by Mennen medical to confirm safety.

Monitor Mounting

Caution: *Mennen Medical is responsible for monitor's wall mount and shelves if and only if they were installed by Mennen Medical or by person authorized by Mennen Medical.*

Warning: *Mennen Medical will not be responsible for the stability of the wall mounts and shelves unless checked by Mennen Medical at least once a year.*

Note: Mennen Medical will perform the required check during the warranty period.

At the end of the warranty period it is the responsibility of the hospital to provide a service call to Mennen medical service department, or to have a service contract.

3.2.5 Accidental Wetting of the Equipment

If, for whatever reason, the equipment accidentally gets wet, remove all patient connections and turn the unit off. Thoroughly wipe all wet areas and then allow sufficient time to ensure that the equipment is completely dry before proceeding.

3.2.6 Patient Connections

All patient connections on the ***Envoy*** Vital Signs modules have special keys to prevent user error.

The rear panels of the MPU, display screen and module rack have no patient connections.

3.2.7 General Hazards

It is the responsibility of the hospital, its consultants and/or contractors to ensure that the wall is adequately safe for mounting the bedside monitor. This includes selecting the appropriate fasteners and installing them properly.

In constructions and remodeling work where the wall covering may be partially or entirely removed, a 16 gauge steel stud must be used for attaching the wall channel. The following mounting instructions are provided as guideline information only.

It is recommended that the hospital establish a policy for periodical check of the wall mounting structure for proper installation.

Warning! *Do not place any portion of the monitor directly over a patient's bed.*

To ensure easy reach and handling of the bedside monitor, all controls should not be higher than 182 cm (72") above the floor.

3.3 *Site Survey*

Performing a site survey ensures that all environmental, electrical, and cabling requirements are taken into consideration. This ensures that the actual installation proceeds as smoothly as possible and that the installed equipment will run reliably.

Perform a site survey every time an ***Envoy*** bedside monitor is installed. The hospital Biomedical Engineer and Facilities Engineer should participate in any discussion, which must include:

Reviewing details and drawings of hospital layout and architecture.

Planning of all cable ducts, raceways, runs, wall plates, pull boxes and other interconnection details.

Establishing length of cable runs.

Reviewing AC power requirements, locations and types of outlets.

Discussing the type of emergency (backup) AC power supply to be used, time of transfer (periodic test), degree of transient introduced into the power line (how long is power interrupted?), frequency and voltage of emergency power.

Reviewing environmental considerations, such as ambient temperature, humidity control, potential static charge, and expected tolerances in the area planned for the ***Envoy***.

Measure AC power disturbances over a period of at least 24 hours with a power line analyzer. It is important to perform this test over the period of emergency power transfer to measure the severity of transients during the transfer.

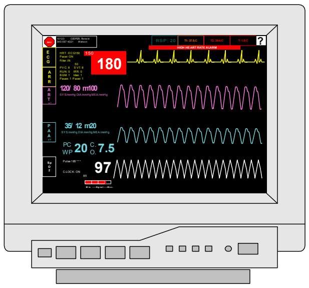
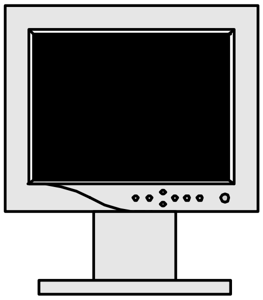
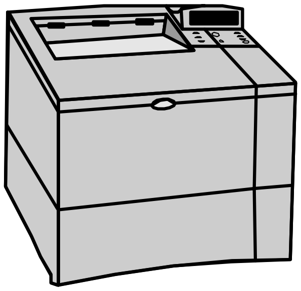
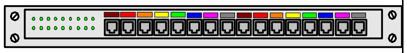
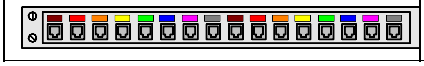
3.3.1 Environmental Requirements

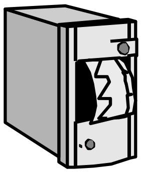
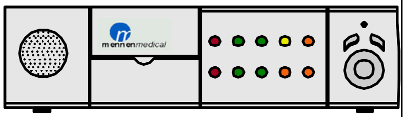
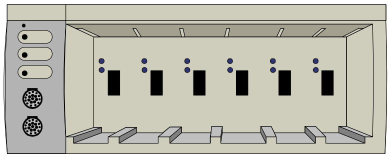
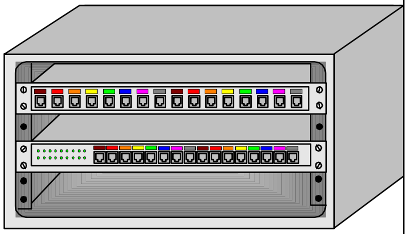
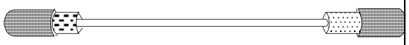
Locate the ***Envoy*** out of direct sunlight and in a clean air atmosphere. Avoid dusty areas or areas where there are airborne dirt particles. Avoid static build-up and discharge, which may result in disruptions of operation and loss of data.

Reasonable environmental parameters are:

Temperature	10° to 32° C (50° to 90° F)
Relative Humidity	30% to 95% (non-condensing)
Temp. rate of change	3.6 F/hr (2 C/hr)
Humidity rate of change	2% hr

The following table describes the equipment physical dimensions and power consumption.

Item	**Height** [cm]	**Width** [cm]	**Depth** [cm]	**Weight** [kg]	**Power** [W]	**Current Peak** [A]	**B.T.U**
20” Display	51 (20”)	51.5 (20.2”)	50 (19.6”)	30 (66.1pd)	150	2.7	500
17” Display	44 (17.3”)	42 (16.5”)	43.5 (17.1”)	20 (44pd)	120	2.2	500
15” Display 	38.5 (15.1”)	36.5 (14.3”)	37 (14.5”)	14 (30.8pd)	100	2.0	350
Flat Screen 	39 (15.3”)	38 (14.9”)	21 (8.2”)	7 15.4pd)			
Laser Printer 	34 (13.3”)	39 15.3”)	50 (19.6”)	20 (44pd)			
LAN Hub 	5.5 (2.1”)	44 (17.3”)	25 (9.8”)	-	100		30
Patch panel 	5.5 (2.1”)	44 (17.3”)	25 (9.8”)		-		-

Item	Height [cm]	Width [cm]	Depth [cm]	Weight [kg]	Power [W]	Current Peak [A]	B.T.U
Recorder 	17 (6.7”)	10 (3.9”)	24 (9.4”)	2.0 (4.4pd)	100	0.5	30
MPU 	9.5 (3.7”)	34 (13.3”)	46 (18.1”)	8 (17.6pd)	200	2.0	700
Module Rack 	15 (5.9”)	31 (12.2”)	15 (5.9”)	1.6 (3.5pd)			
Hub and Patch Panel Enclosure 							
MR1 to MR2 cable  MPU to MR1 cable	Length: 0.7 m (2.3 ft) 1.7 m (5.5 ft)						

To complete the site survey please fill the following form and send it with the purchase order.

3.4 Unpacking and Inspection

Before unpacking the ***Envoy*** bedside monitor, inspect visually the packaging for any signs of damage or abuse, which may have resulted during shipment. If any signs of external damage are visible, you have to contact your nearest Mennen Medical agent before proceeding to unpack the unit. Failure to do so could invalidate the warranty.

Unpack carefully the package and check all components against the packing list to confirm their availability. If any damage appears or any part is missing, contact your Mennen Medical agent immediately. Do not attempt to set up the system if any component is damaged.

3.5 Setting Up the Basic System

The ***Envoy*** basic system consists of the following parts: the LAN hub and patch panel, the display screen, the MPU, the module rack, and the nurse station. These should be set up according to system description. Take care when handling the components.

The display screen can be placed either on top of the MPU or on a wall mount. A variety of different types of wall mounts can be used. Select the wall mount according to your hospital’s individual requirements. Wall mounts obtained from Mennen Medical are supplied with detailed instructions.

Proper installation of the ***Envoy*** is divided into the following steps:

Connecting and wiring the LAN cables

Mounting the LAN outlets

Mounting and connecting the LAN hub and the patch panel

Mounting the Envoy monitor on the wall

Connecting the interconnection cables for each device

Mounting the nurse station devices

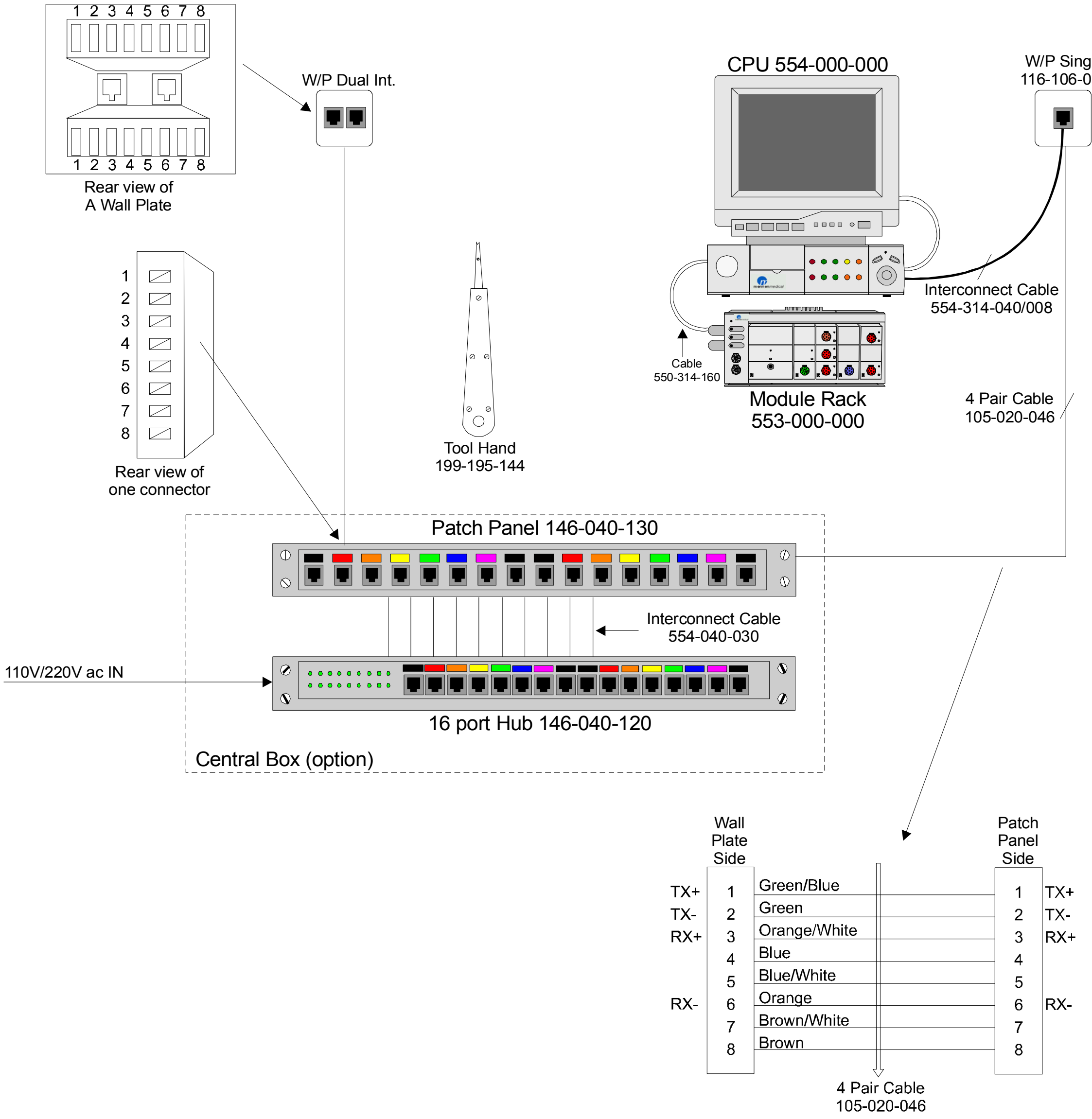
Note: *If a hospital has special installation requirements, these may call for special planning and materials that must be furnished by that hospital and are not covered by this manual.*

3.5.1 Connecting and Wiring the LAN cables

➢ ***To connect and wire the LAN cables:***

1. After determining the location of the nurse station and the ***Envoy*** bedside monitors, for each ***Envoy*** bedside monitor, place a standard shielded twisted pair LAN cable from the nurse station to the bedside monitor. Leave 20cm (7.8") spare cable on the bedside monitor side, and 120cm (47.2") spare cable on the nurse station side.

2. For each ***Envoy*** bedside monitor, connect the four wires (two Rx and two Tx wires, according to the connections drawing) to the LAN outlet.


1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
Rear view of
A Wall Plate
W/P Dual Int.
CPU 554-000-000
W/P Single
116-106-034
1
2
3
4
5
6
7
8
Rear view of
one connector
Tool Hand
199-195-144
Interconnect Cable
554-314-040/008
Cable
550-314-160
Module Rack
553-000-000
4 Pair Cable
105-020-046
Patch Panel 146-040-130
Interconnect Cable
554-040-030
110V/220V ac IN
16 port Hub 146-040-120
Central Box (option)
Wall
Plate
Side
Patch
Panel
Side
4 Pair Cable
105-020-046

Wall Plate Side			Patch Panel Side	
TX+	1	Green/Blue	1	TX+
TX-	2	Green	2	TX-
RX+	3	Orange/White	3	RX+
	4	Blue	4	
	5	Blue/White	5	
RX-	6	Orange	6	RX-
	7	Brown/White	7	
	8	Brown	8	

Figure 3-2. LAN Cables Wiring Diagram

3.5.2 Mounting the LAN outlets

After placing the LAN cables, mount the LAN outlets on its place according to the hospital requirements. The following three types of LAN outlets are available:

Wall outlet mounted on the wall surface.

Wall outlet mounted behind the wall surface.

Wall outlet mounted together with other outlets on an aluminum plate.

3.5.3 Mounting and Connecting the LAN hub and the patch panel

➢ ***To mount the LAN hub and the patch:***

1. Mount the LAN hub and the patch panel inside the enclosure and place them under the nurse station desk (or at any other convenient place). Secure them if necessary.
2. At the nurse station side, connect each LAN cable to the patch panel according to the wiring installation diagram (see Figure 3-3).

For each ***Envoy*** bedside monitor, connect a bridge cable from the patch panel to the LAN hub.

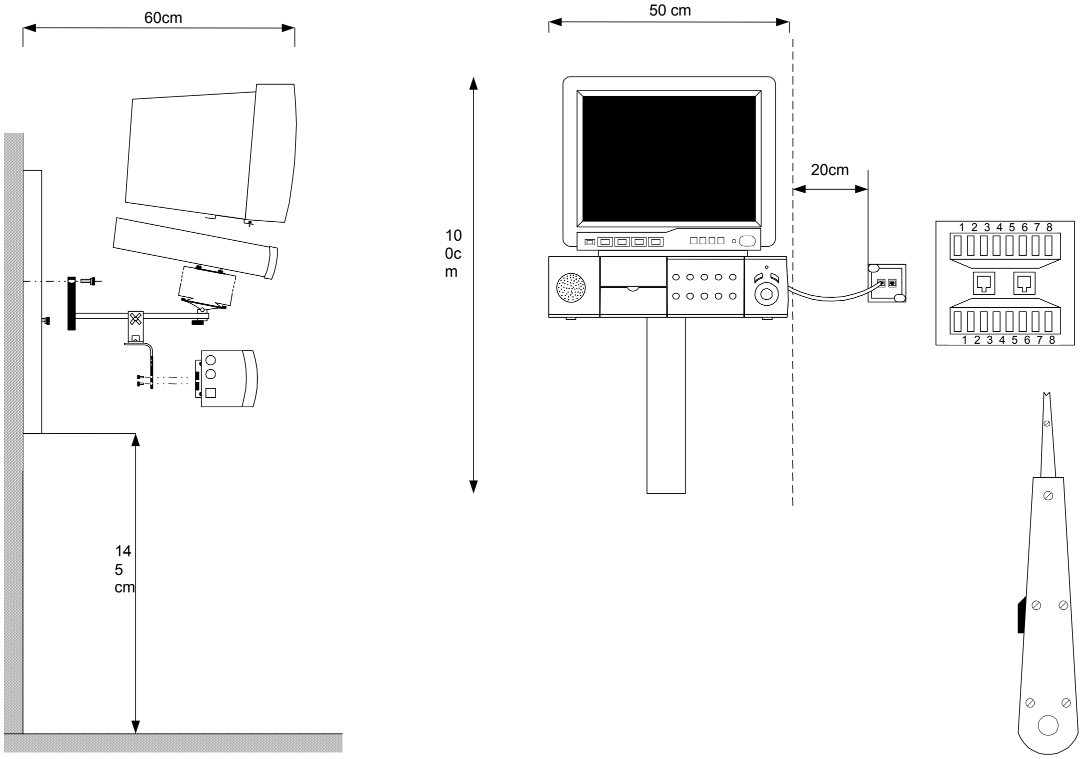


Figure 3-3. ***Envoy*** *Mounting Diagram*

3.5.4 Mounting the Envoy monitor on the wall

To properly mount the ***Envoy*** bedside monitor, refer to the wall mounting instructions supplied with your wall mounting kit. It is the responsibility of the hospital, its consultants, and/or contractors to determine that the wall is adequate to safely mount instrumentation. This includes the selection of appropriate fasteners and the proper installation.

The ***Envoy*** bedside monitor can be installed as a permanently mounted fixture on a wall. The following are mounting instructions for mounting the ***Envoy*** bedside monitor on different types of walls, using a Mennen Medical mounting system.

Mennen Medical has a number of different mounting kits for mounting the ***Envoy***, depending on the size and type of display screen and individual hospital conditions, see section 3.5.5 on page 20. Mennen Medical employs a Polymount Biomedical Monitor Mounting System. The mounting kit described as follows is for mounting the display screen, the MPU, the module rack and a recorder.

The items required for the mounting kit of the basic non-split mounting are given in Bill of Material no. 800-050-820 below:

Bill of Material (800-050-820) REV. C

Desg	Item no.	Rev	Description	Unit	Qty	SR
ECN 8073 REV. A ECN 8208 REV. B ECN 8274 REV. C						
001	260-375-010		WALL MOUNT – HOR 2000 OEM	EA	1	
002	260-375-015		POLY QUIP INFUSION PUMP MOUNT (5”)	EA	1	B
003	135-101-040		WASHER – SPLIT LOCK #8	EA	4	B
004	134-103-019		SCREW, 8-32” X 3/8”, PH, PHIL, SS	EA	4	B
005	260-375-016		V-BLOCK MOUNTING SYSTEM WITH KNOB SCREWS	EA	2	B
006	134-401-011		SCREW 1/4-20 X 1/2 PH PHIL SS	EA	8	B
007	800-050-821	C	ENVOY INST. FOR MOUNT NON-SPLIT DISPL. W2 MRW REC	EA	1	S
011	134-103-030		SCREW 8-32 X 1/2 PH PHIL	EA	2	B
012	134-102-200		THUMB SCREW 6-32 X 5/16 SS	EA	2	B
013	134-102-032		SCREW 6-32 X 7/16 PH SS PHIL	EA	2	B
014	133-102-031		NUT – FIBER NUT 6-32	EA	2	B
015	135-101-030		WASHER SPLIT LOCK #6	EA	4	B

When the mounting of the ***Envoy*** bedside monitor is completed, the display screen is on top of the MPU, and the module rack is below the MPU. If there is a recorder, it is located on the right hand side of the module rack.

Note: The non-split mounting option is for a 15”display only – a 17” display must not be used.

The items required for the mounting kit of the basic split mounting option are found in Bill of Material no. 800-050-825 below:

Bill of Material (800-050-825) REV. C

Desg	Item no.	Rev	Description	Unit	Qty	SR
ECN 8073 REV. A ECN 8208 REV. B ECN 8274 REV. C						
001	260 375-010		GCX mounting channel	EA	1	
002	260-375-015		BCX polyquip - 8”	EA	1	B
003	135-101-040		Washer split locks - 8”	EA	4	B
004	134-103-026		Screw/washer 8-32X3/8	EA	4	B
005	134-102-040		Screw 6-32ZX1/2 soc cap s	EA	2	B
006	260-137-016		2 V-block	EA	2	B
007	134-401-011		Plate carrier, recorder	EA	1	S

Make sure to unpack and inspect the mounting kit package.

3.5.4.1 Mounting the Wall Channel

Wall Channel Positioning Guidelines

See Figure 3-4 for an illustration of the wall channel.

The following mounting guidelines apply to both 15” and 17” display screens.

Place the bottom edge of a 19” (48.26cm) wall channel approximately 56” (142.24cm) above the floor. Taller monitors require lower channel placement.

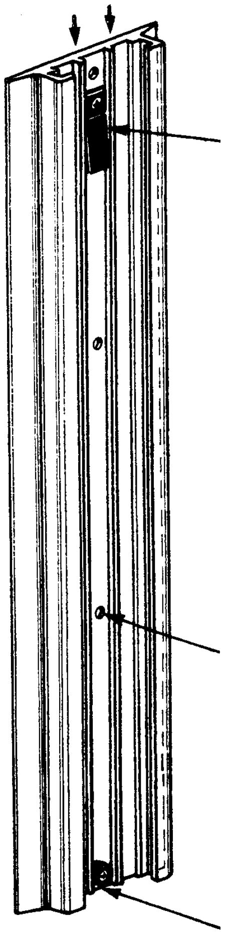
The bottom of the monitor should be 4½” (11.43cm) above the bottom of the channel [6½” (16.51cm) when using a 15” (38.1cm) support arm with diagonal brace], with the arm at its lowest position.

To ensure easy reach, all controls should not be higher than 72” (182.88cm) above the floor. Monitors can always be adjusted up over a 12” (30.48cm) range in a standard 19” (48.26cm) wall channel. For example: 15” (38.1cm) high monitors: Bottom of channel + 52” (132.08cm).

Allow 14” (35.56cm) clearance on either side of the channel centerline to clear objects, such as over-bed lighting, privacy curtains, adjacent walls or columns, door swing arcs, etc.

Power and signal outlets should be 68” - 72” (172.72-182.88cm) above the floor. Avoid oxygen, vacuum, and air outlets and space for attendant flow meters and regulators.

Note: *Do not place any part of the monitor directly over a patient’s bed.*



Align slide squarely with wall channel and press down firmly. Note shear tabs.

Depressible channel stop with one #10-32 x 3/8” flat head machine screw.
Depress tab to remove slide/arm from the wall channel.

#12 x 2- ¾” high tensile sheet metal screws or ¼-20 x 3” pan head machine screws with toggle wings (4).

Fixed channel stop

Figure 3-4. Wall Channel Positioning

When positioning the wall channel the following options are available:

Positioning the wall channel on drywall (gypsum board) over 16 gauge sheet metal or wood studs.

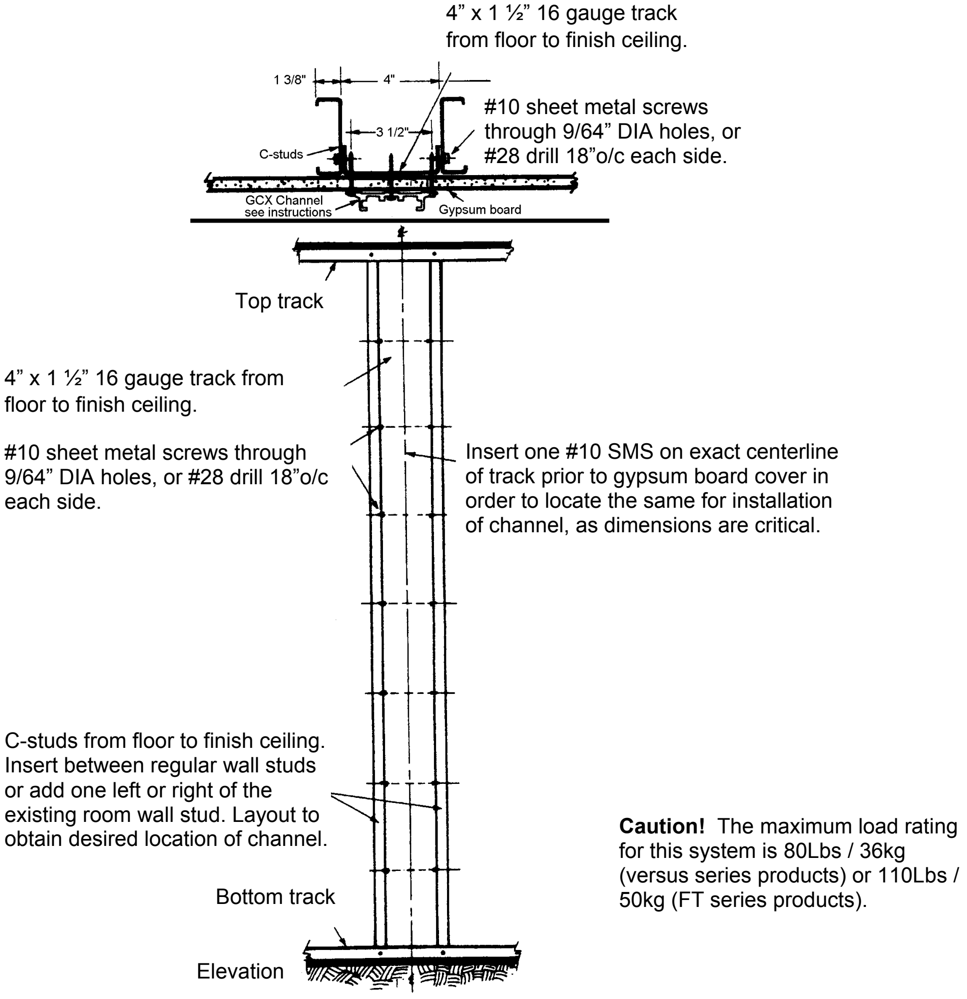
Positioning the wall channel on drywall (gypsum board) over sheet metal studs less than 16 gauge.

Positioning the wall channel on plaster coat over expanded metal lath on steel studs, hollow tile, or hollow block.

Positioning the wall channel on concrete walls.

Positioning the Wall Channel on Drywall (GYPSUM Board) Over 16 Gauge Sheet Metal or Wood Studs

See Figure 3-5 for the maximum load rating for 5/8”gypsum board walls used for wall mounted instrumentation.


4” x 1 ½” 16 gauge track from floor to finish ceiling.
1 3/8"
4"
3 1/2"
#10 sheet metal screws through 9/64” DIA holes, or #28 drill 18”o/c each side.
C-studs
GCX Channel see instructions
Gypsum board
Top track
4” x 1 ½” 16 gauge track from floor to finish ceiling.
#10 sheet metal screws through 9/64” DIA holes, or #28 drill 18”o/c each side.
Insert one #10 SMS on exact centerline of track prior to gypsum board cover in order to locate the same for installation of channel, as dimensions are critical.
C-studs from floor to finish ceiling. Insert between regular wall studs or add one left or right of the existing room wall stud. Layout to obtain desired location of channel.
Bottom track
Elevation

Caution! The maximum load rating for this system is 80Lbs / 36kg (versus series products) or 110Lbs / 50kg (FT series products).

Figure 3-5. Positioning the Wall Channel on Drywall

➢ ***To position the wall channel:***

1. Locate the exact centerline of the stud.
2. Drive a #4 finishing nail through the drywall to contact the stud.
3. Withdraw and drive again 3/8” (0.95cm) to the right and left until the edges of the stud are located and the centerline is determined. The wall channel is 4” (10.16cm) wide and covers these exploratory holes.
4. Drill four 11/64” (0.43cm) diameter holes for #12x2 - 3/4” high tensile combination head screws in a single 16-gauge stud through the channel centerline.
5. Insert the top screw and level the channel and then mark and drill the other holes.

***Note**: The wall channel must be anchored into the stud.*

Positioning the Wall Channel on Drywall (GYPSUM Board) Over Sheet Metal Studs Less than 16 Gauge

➢ ***To position the wall channel:***

1. Locate the centerline of the stud, as in the previous procedure (step 1).
2. Use ¼ - 20x3” pan head machine screws.
3. Drill 11/16” (1.74cm) diameter holes with a sharp speed bore or twist drill (requires pilot hole). The round stop at the bottom of the channel goes over the shank of the bottom screw.
4. Affix the spring wings to the screws. Starting at the top, push in and align the wings in a vertical mode and tighten.
5. Use a level to make sure that the channel is vertical prior to final seating of the screws.

***Note**: The wall channel must be anchored into the stud.*

Positioning the Wall Channel on Plaster Coat Over Expanded Metal Lath on Steel Studs, Hollow Tile, or Hollow Block

➢ ***To position the wall channel:***

1. Drill 5/8” (1.58cm) holes.
2. Branch the holes in hard materials to allow for the toggle wing to pass through.
3. Install the machine screws and toggle wings.

Positioning the Wall Channel on Concrete Walls

This type of installation should not be attempted by anyone lacking experience and expertise in concrete and concrete fasteners, and/or is not willing or able to follow explicit instructions by the manufacturer of the fasteners.

It is recommended that #12x2” Rawl Plugs (lead/hemp) be used due to the alignment problem of drilling holes in concrete.

⚠ *Any fastener can be misused due to incorrect selection or poor workmanship.*

➢ ***To position the wall channel:***

1. Use #11x2-¼” Buildex combination head screws in the lower three holes.
2. Use a ¼-20 steel expansion anchor of at least 1½” (3.81cm) depth in the top hole.
3. Holes must be marked very accurately and center punched to reduce drill bit walking. Sharp carbide-tipped drills and roto-hammers must be used.
4. Holes must be drilled straight, and be of the correct diameter and depth when drilled into concrete, and the bulb-blown clean of any debris. Disregard the thickness of any plaster and make compensatory allowance in the length of the screw.
5. Use only sheet metal screws, never use grade 2 screws such as wood screws or lag bolts. Never attempt to mount into crumbly materials or into improperly prepared holes. Special fasteners are not included with the wall channels but are available from construction supply companies, or from the manufacturer upon request.

Through Wall, Solid Partition Wall, and Back to Back Installations

Sufficient length ¼-20"machine screws, nuts, washers, and/or back plates must be provided by the user to mount the channel by drilling all the way through the thin partition wall.

If two channels are to be mounted back to back, internally threaded sleeves, exact length screws, and specific procedures are available from the manufacturer upon request. A Portalign drill fixture is recommended for this procedure.

Special Applications

Channels can be attached to a GCX 4"X4", 1/8" wall aluminum support column or certain mullions, etc. GCX Corporation will discuss innovative solutions to wall mounting problems for any situation not covered by these guidelines.

3.5.4.2 Physical Mounting of the Monitor

Recommended Mounting Systems

Mennen Medical recommends the following mounting systems:

- Polymount Biomedical Monitor Mounting System, VB Series
- Polymount Biomedical Monitor Mounting System, Side Clamping

Mounting Attachment Method

Plate size	***Monitor width ranges***
8" (20.32cm)	8 ¼" - 11 ¼"
11" (27.94cm)	11 ¼" - 14 ¼"
14" (35.56cm)	14 ¼" - 17 ¼"
17" (43.18cm)	17 ¼" - 20 ¼"

Other monitor attachment methods are available, using "Clip Strips", Adapter Plates, prepared hole patterns for direct screw attachment on other stock-size plates [5" (12.7cm); 7.6" (19.30cm); 9" (22.86cm); 15.36" (39.01cm)].

Only VB series systems are modular and may be changed as to mounting plate size and style at nominal cost. 15" arms with diagonal braces are available by special order in conjunction with the above.

Pre-Attachment Considerations

The maximum load limit of the system is 80 lb. (36 kg.). The instrument's center of gravity should not be more than 6 ft (1.82m) above the bottom of the monitor and not in front of the Elevating Bar, to which the mounting plate is attached.

***Note**: The turning radius of larger monitors may be restricted under these conditions.*

The side clamps are at an 89° angle to the side of the monitor. Tighten the screws to bring them flush with the sides of the monitor (90°). Over-tightening the screws can crush the sides of the monitor or destroy the function of the clamp by exceeding the 90° angle. The purpose of the small screws penetrating the side of the case is not to clamp, but to prevent the loss of clamping pressure in the unlikely event of a sharp blow to the monitor.

Make sure that the channel is properly positioned and is securely mounted to the wall according to the wall channel mounting instructions (supplied separately).

Sequential Monitor Attachment Procedure

See Figure 3-6 for an illustration of the wall channel and a 12” arm.

➢ ***To attach the monitor:***

1. Insert the adjustable stop (small aluminum bar, 2½” x ½” x ¼” with black nylon thumbscrew) in the top of the wall channel and rest against the fixed stop at the bottom of the wall channel.
2. Insert the black slide of the Arm/Mounting Plate assembly in the top of the wall channel. Align squarely and push down into the channel until the desired mounting height is reached. Apply force at the base end of the arm nearest the slide. Push the adjustable stop up, until it is flush with the bottom surface of the slide, and with your fingers, tighten the nylon thumbscrews.
3. Rotate the mounting plate so that the black plug in the sidewall of the elevating head faces the wall channel. Insert the side clamps in the mounting plate and begin tightening the screws with your fingers. This ensures a straight start. Now use a no.1 Phillips screwdriver to tighten the screws.
   Center the monitor on the mounting plate and swivel to test the turning radius clearance. Do not allow the front to back center of the monitor to extend beyond the clamping screw even if a full turning radius is not possible.
4. Measure to ensure that each clamp extends an equal distance from the end of the mounting plate. Also measure the distance from the edge of the clamp to the front of the monitor to ensure that the case is square with the plate and the mounting plate is solidly in contact with the bottom of the monitor. Tighten the clamping screws as previously described in “Pre-Attachment Considerations”, step B. At least 3/8” of the screw’s thread must penetrate the plate.
5. Use a 3/32” diameter bit with a sleeve exposing no more than ¼” of the bit to drill through the upper holes of the clamps into the sides of the case.

In some cases, it is preferable to mark the holes, remove the monitor, slide out the chassis and only then drill the holes. Use judgment and take into consideration the type and thickness of the case material and the design of the monitor.

6. When the channel has been firmly secured to the wall, install the isolation transformer (optional) and the two arms by sliding them through the channel. If the arm height must be readjusted after installation, loosen the adjustable stop. Grasp the arm at the base end nearest the wall with one hand while supporting the weight of the monitor with the other hand. Apply force at the base end of the arm and slowly push up or pull down as necessary.

Never attempt to remove the mounting assembly from the wall channel while loaded with instruments.

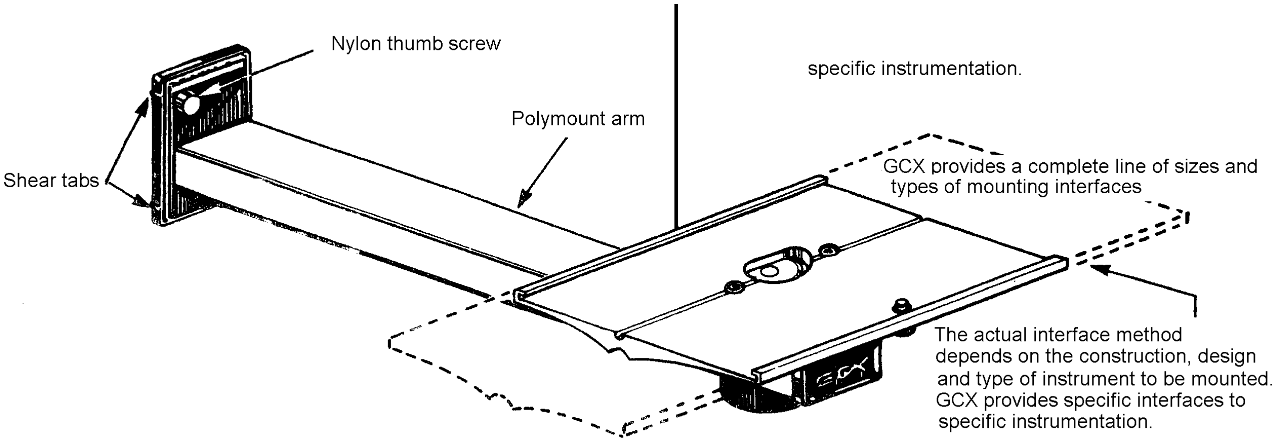

Nylon thumb screw
specific instrumentation.
Polymount arm
Shear tabs
GCX provides a complete line of sizes and types of mounting interfaces
The actual interface method depends on the construction, design and type of instrument to be mounted. GCX provides specific interfaces to specific instrumentation.

Figure 3-6. Wall Channel and a 12” Arm

3.5.5 Mounting Options

As mentioned above on page 12, Mennen Medical has a number of different mounting kits for mounting the ***Envo***y. The two basic options for mounting the ***Envoy*** bedside monitor are the following:

Non-split – the display screen is placed directly on the MPU, the MPU sits on a support arm, the MR can be attached in various ways depending on the configuration of the system.

Split – the display screen and MPU are each placed on separate support arms, the MR can be attached in various ways depending on the configuration of the system.

Each of the two basic mounting options can be set up according to one of four combinations, resulting in a total of eight combinations for mounting the ***Envoy*** bedside monitor:

- Mounting of non-split display with module rack and recorder (See Mennen Mounting Drawing 800-050-821 on page 23).
- Mounting of non-split display with module rack.
- Mounting of non-split display with two module racks and recorder.
- Mounting of non-split display with two module racks.
- Mounting of split display with module rack and recorder (See Mennen Mounting Drawing 800-050-826 on page 26).
- Mounting of split display with two module racks and recorder.
- Mounting of split display with two module racks.
- Mounting of split display with module.
- Mounting of split display with one module rack installed into two module racks and recorder.
- Mounting of split display with one module rack installed into two module racks.
- Mounting of Roller stand for non-split display with module rack and recorder.
- Mounting of Roller stand for non-split 15" display with two module racks.

For optimal safety, when mounting the Envoy bedside monitor make sure to carefully follow the instructions.

The following table lists the possible mounting installations, and the part numbers of each appropriate drawing and bill of material:

Description	**Part Number (P/N)**	
	Bill of Material (BM)	Drawing
Mounting of non-split display with module rack	800-050-810	800-050-811
Mounting of non-split display with two module racks and recorder	800-050-830	800-050-831
Mounting of non-split display with module rack and recorder	800-050-820	800-050-821
Mounting of non-split display with two module racks	800-050-840	800-050-841
Mounting of split display with two module racks and recorder	800-050-835	800-050-836
Mounting of split display with two module racks	800-050-845	800-050-846

Mounting of split display with module rack and recorder	800-050-825	800-050-826
Mounting of split display with module rack	800-050-815	800-050-816

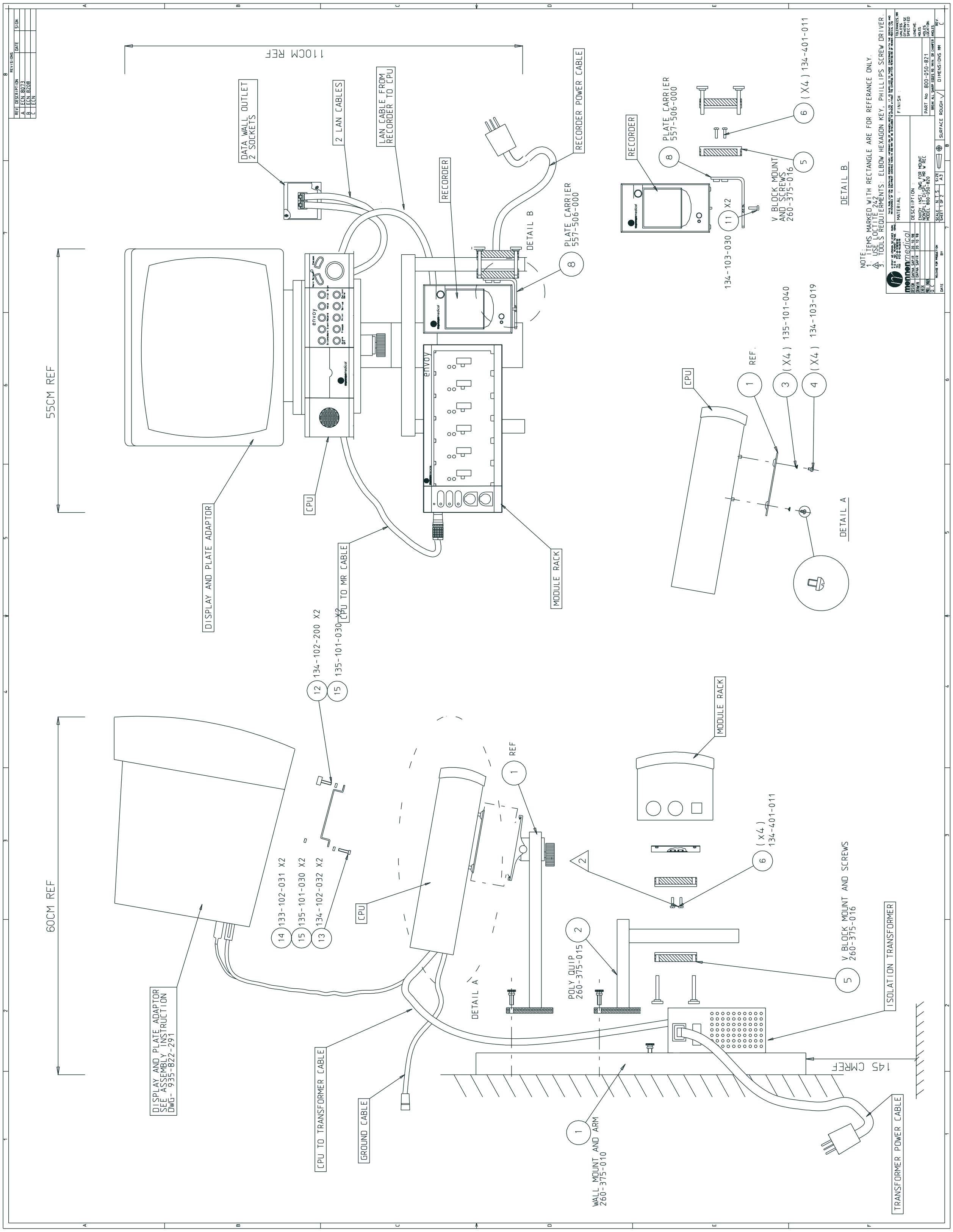
3.5.5.1 Attachment of the Display Screen, the Module Rack and the Recorder

The Mennen Medical mounting kit includes the relevant drawing for each of the mounting options (see Section 3.6 above), as well as instructions for attaching the Display Screen, Module Rack/s and Recorder.

The following mounting instructions apply to the basic non-split mounting option for the Display Screen, Module Rack and Recorder – see also the attached BM (800-050-820), and the attached drawing (800-050-821) on page 3 23.

Bill of Material (800-050-820)

Desg	Item no.	Rev	Description	Unit	Qty	SR
	ECN-8073-REV.	A				
	ECN-8208-REV.	B				
001	260-375-010		WALL MOUNT-HOR OEM	EA	1	
002	260-375-015		POLY QUIP INFUSION PUMP MOUNT WITH 8" SUPPORT	EA	1	B
003	135-101-040		WASHER-SPLIT LOCK #8	EA	4	B
004	134-103-019		SCREW, 8"-32X3\8, PH, PHIL, SS	EA	4	B
005	260-375-016		V-BLOCK MOUNTING SYSTEM WITH KNOB SCREWS	EA	2	B
006	134-401-011		SCREW ¼-20X ½ PH PHIL SS	EA	8	B
007	800-050-821	B	ENVOY INST DWG FOR MOUNT NONSPLIT DISPL W MR W R	EA	1	S
011	134-103-030		SCREW 8-32 X ½ PH PHIL	EA	2	B
012	134-102-041		SCREW 6-32 X ½ PH PHIL	EA	4	B


REVISIONS
REV DESCRIPTION DATE SIGN.
A ECN 8073
B ECN 8208
C ECN
110CM REF
55CM REF
60CM REF
145 CMREF
DATA WALL OUTLET 2 SOCKETS
2 LAN CABLES
LAN CABLE FROM RECORDER TO CPU
RECORDER
RECORDER POWER CABLE
DETAIL B
PLATE CARRIER 557-506-000
8
DISPLAY AND PLATE ADAPTOR
CPU
CPU TO MR CABLE
MODULE RACK
envoy
RECORDER
PLATE CARRIER 557-506-000
(X4) 134-401-011
6
5
V BLOCK MOUNT AND SCREWS 260-375-016
11 X2
134-103-030
DETAIL B
CPU
1 REF.
3 (X4) 135-101-040
4 (X4) 134-103-019
DETAIL A
12 134-102-200 X2
15 135-101-030 X2
14 133-102-031 X2
15 135-101-030 X2
13 134-102-032 X2
DISPLAY AND PLATE ADAPTOR SEE ASSEMBLY INSTRUCTION DWG- 935-822-291
CPU
CPU TO TRANSFORMER CABLE
GROUND CABLE
DETAIL A
1 REF
MODULE RACK
2
6 (x4) 134-401-011
2 POLY QUIP 260-375-015
5 V BLOCK MOUNT AND SCREWS 260-375-016
ISOLATION TRANSFORMER
1 WALL MOUNT AND ARM 260-375-010
TRANSFORMER POWER CABLE
NOTE:
1. ITEMS MARKED WITH RECTANGLE ARE FOR REFERANCE ONLY.
2 USE LOCTITE 242
3. TOOLS REQUIERMENTS: ELBOW HEXAGON KEY, PHILLIPS SCREW DRIVER.
mennen medical
KIRYAT WEIZMANN SCIENCE PARK P.O.B. 102, REHOVOT 76100, ISRAEL TEL: 972-8-9383830 FAX: 972-8-9406596
DESIGN DAFNA SAPIR 20.10.98
DRAWN DAFNA SAPIR 20.10.98
CHECK
PROJ. ENGR.
Q.C
RELEASE FOR PRODUCTION
DATE BY
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MATERIAL :
FINISH :
DESCRIPTION :
ENVOY INST. DWG FOR MOUNT NONSPLIT DISPL W MR W REC MODEL 800-050-820
PART No :800-050-821
TOLERANCES, MM UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER
SCALE : N.T.S. SHEET 1 OF 2
SIZE A3
SURFACE ROUGH.
DIMENSIONS MM
REV. C

Figure 3-7. Installation of Non-split Display with Module Rack and Recorder

➢ ***To mount a non-split display with module rack and recorder:***

1. Attach the channel (item 1) to the wall and install the isolation transformer and the arms (items 1, 2), by sliding them through the channel. The bottom of the channel should be at least 1.45 m from the ground. Use GCX assembly instructions for item 1.
2. Attach the MPU adapter plate (item 1) to the bottom of the MPU using screws (items 3, 4).
3. Place the MPU on the mounting interface (item 1) by sliding the MPU adapter plates sideways into the mounting plate.
4. Attach the display adapter plate to the MPU using screws (item 12).
5. Attach the display base to the adapter plate (See display assembly instructions).
6. Attach the module rack to GCX V-block (item 5) using screws (item 6).
7. Join the V-block around the left arm of item 2 by turning in the four screws. Keep the V-block surfaces parallel to each other.
8. Attach the recorder plate carrier (item 8) to the V-block (item 5) using screws (item 6).
9. Attach the plate carrier to the recorder using screws (item 11).
10. Attach the assembly to the right arm of item 2.
11. Connect cables from MPU to the display.
12. Connect the MPU to transformer cable from MPU back panel to transformer, and from the transformer to the mains with the transformer power cable.
13. Connect the recorder power cable from the recorder to the mains.
14. Connect the MPU cable to the module rack.
15. Fix the wall plate to the data wall outlet socket.
16. Connect the two LAN cables from the MPU back panel to data wall outlet socket, and the LAN cable from the recorder back panel to the MPU side panel.
17. Connect the ground cable from the MPU back panel to the hospital ground point.

Note: If the transformer is not in use, connect the power cord from the MPU to the mains.

3.5.5.2 Mounting of Split Display with Module Rack and Recorder

The following mounting instructions apply to the basic split mounting option for the Display Screen, Module Rack and Recorder – see also the attached BM (800-050-825), and the attached drawing (800-050-826) on page 26.

Note: Mounting instructions and Bill of Materials for the other possible combinations – see page 21 – can be obtained from Service by request.

Bill of Material (800-050-825)

Desg	Item no.	Rev	Description	Unit	Qty	SR
ECN-8072-REV.		A				
001	260-375-013		CHANNEL 25”	EA	1	B
002	265-375-019		WALL MOUNT, SUPPORT ARM 15”	EA	2	S
003	265-375-015		POLY QUIP INFUSION PUMP MOUNT WITH 8” SUPPORT	EA	1	B
004	135-101-040		WASHER-SPLIT LOCK “8	EA	4	B
005	134-103-019		SCREW, 8-32”X3\8, PH, PHIL, SS	EA	4	B
006	260-375-016		V-BLOCK MOUNTING SYSTEM WITH KNOB SCREWS	EA	2	B
007	134-401-011		SCREW ¼-20 X ½ PH PHIL SS	EA	8	B
008	557-506-000	B	PLATE CARRIER, RECORDER	EA	1	S
009	260-375-018		ADAPTER PLATE	EA	1	B
010	800-050-826	A	ENVOY INST DWG FOR MOUNT SPLIT DISPL W MR W R	EA	1	S
011	134-103-030		SCREW 8-32 X ½ PH PHIL	EA	2	B

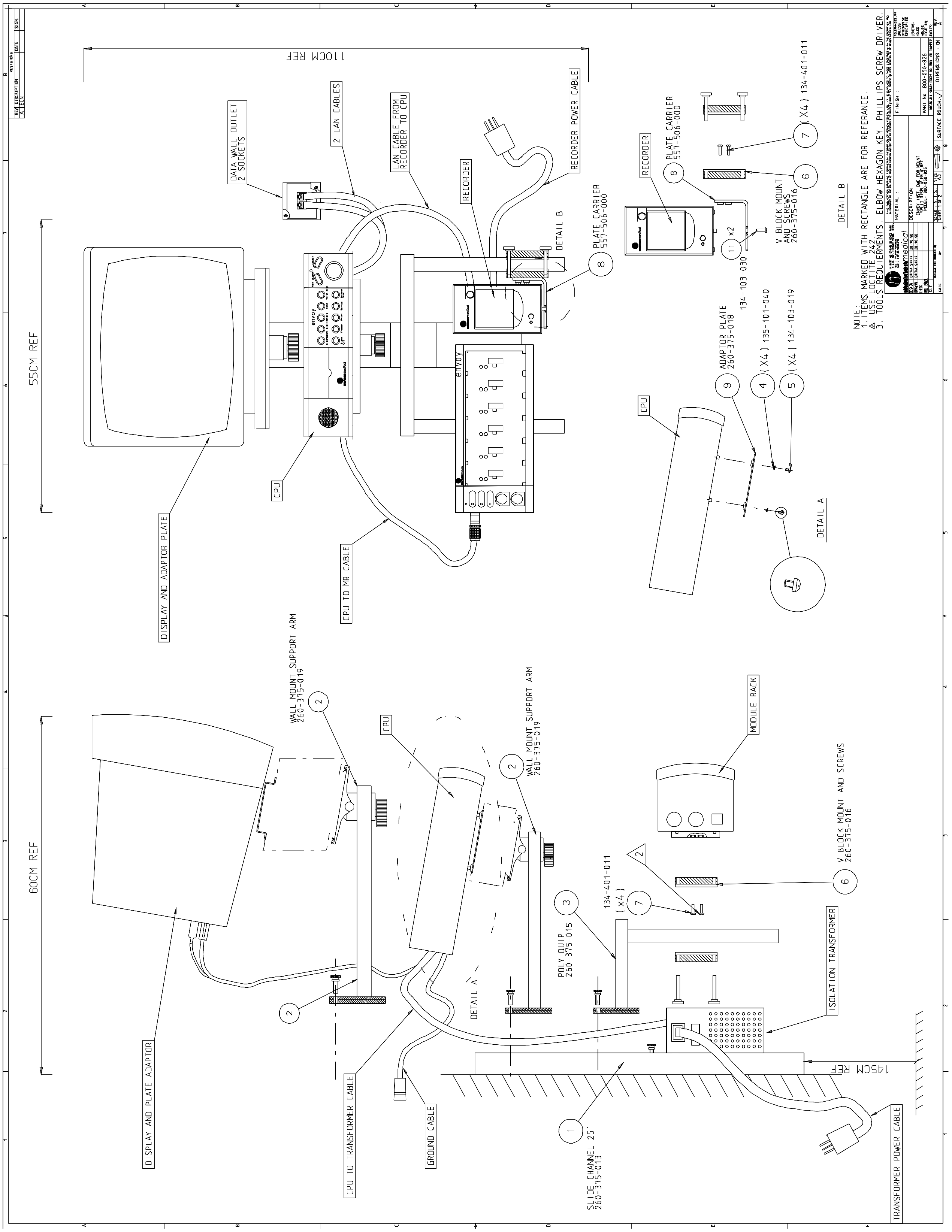

110CM REF
DATA WALL OUTLET 2 SOCKETS
2 LAN CABLES
LAN CABLE FROM RECORDER TO CPU
RECORDER
RECORDER POWER CABLE
DETAIL B
PLATE CARRIER 557-506-000
8
RECORDER
PLATE CARRIER 557-506-000
8
11 x2
134-103-030
V BLOCK MOUNT AND SCREWS 260-375-016
6
7
(X4) 134-401-011
DETAIL B
55CM REF
envoy
CPU
DISPLAY AND ADAPTOR PLATE
CPU TO MR CABLE
ADAPTOR PLATE 260-375-018
9
4
(X4) 135-101-040
5
(X4) 134-103-019
CPU
DETAIL A
NOTE:
1. ITEMS MARKED WITH RECTANGLE ARE FOR REFERANCE.
2. USE LOCTITE 242.
3. TOOLS REQUIREMENTS: ELBOW HEXAGON KEY, PHILLIPS SCREW DRIVER.
60CM REF
WALL MOUNT SUPPORT ARM 260-375-019
2
CPU
WALL MOUNT SUPPORT ARM 260-375-019
2
MODULE RACK
V BLOCK MOUNT AND SCREWS 260-375-016
6
2
134-401-011 (X4)
7
3
POLY QUIP 260-375-015
DETAIL A
ISOLATION TRANSFORMER
145CM REF
2
DISPLAY AND PLATE ADAPTOR
CPU TO TRANSFORMER CABLE
GROUND CABLE
1
SLIDE CHANNEL 25' 260-375-013
TRANSFORMER POWER CABLE

Figure 3-8. Installation of Split Display with Module Rack and Recorder

➢ ***To mount a split display with module rack and recorder:***

1. Attach the channel (item 1) to the wall and install the isolation transformer and the arms (items 1, 2, 3), by sliding them through the channel. The bottom of the channel should be at least 1.45 m from the ground. Use GCX assembly instructions for item 1.
2. Attach the display base to the display (See display assembly instructions).
3. Place the display assembly on its mounting plate (item 2), by sliding the adapter plate sideways into the mounting plate.
4. Attach the MPU adapter plate (item 9) with the plunger hole facing front, to the bottom of the MPU, using screws (items 4, 5).
5. Place the MPU assembly on its mounting plate (item 2), by sliding the adapter plate sideways into the mounting plate.
6. Attach the module rack to GCX V-block (item 6) using screws (item 7).
7. Join the V-block around the left arm of item 3 by turning in the four screws. Keep the V-block surfaces parallel to each other.
8. Attach the recorder plate carrier (item 8) to the V-block (item 6) using screws (item 7).
9. Attach the plate carrier (item 8) to the recorder using screws (item 11).
10. Attach the assembly to the right arm of item 2.
11. Connect cables (video and power) from the display to the MPU.
12. Connect the MPU to transformer cable from MPU back panel to the transformer, and from the transformer to the mains using the transformer power cable.
13. Connect the recorder power cable from the recorder to the mains.
14. Connect the MPU cable to the module rack.
15. Fix the two sockets data wall outlet to the wall.
16. Connect the two LAN cables from the MPU back panel to the two sockets data wall outlet, and the LAN cable from the recorder back panel to the MPU side panel.
17. Connect the ground cable from the MPU back panel to the hospital ground point.

Note: *If the transformer is not in use, connect the power cord from the MPU to the mains.*

3.5.6 Mounting the Nurse Station Devices

It is recommended to mount the nurse station according to the following figure.

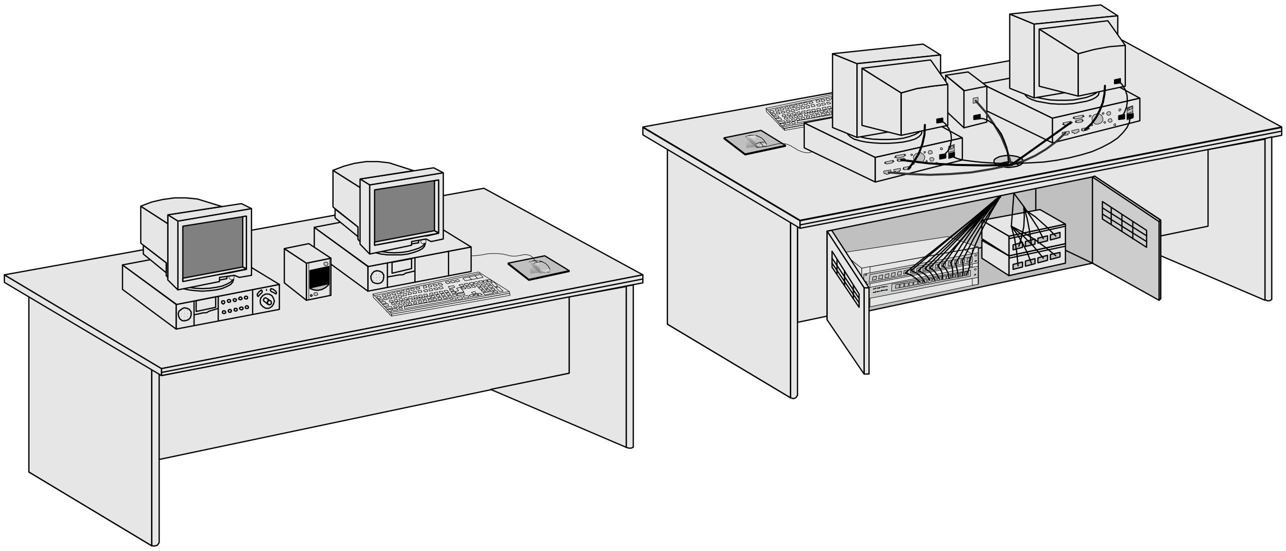
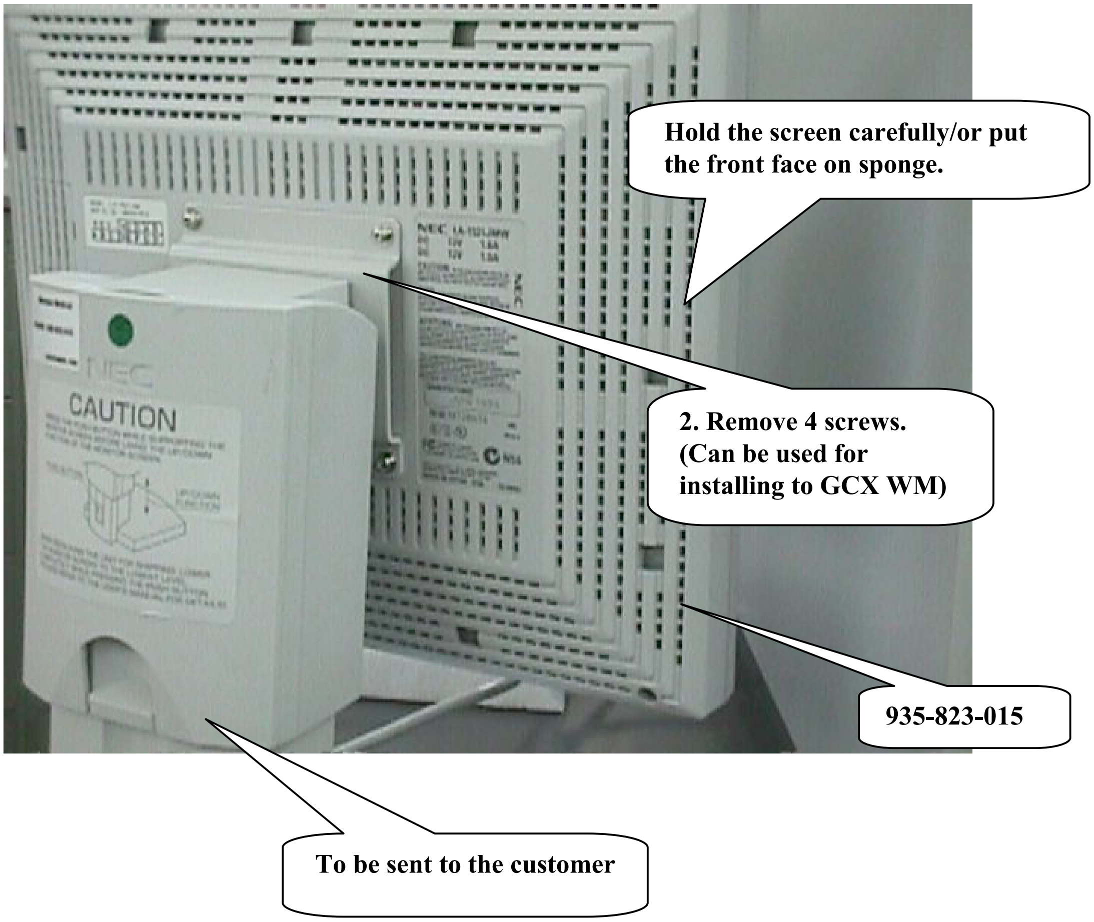


Figure 3-9. Mounting the Nurse Station Devices

3.5.7 Mounting the Flat Screen (LCD NEC 15" or 20")

To assemble and Disassemble the LCD NEC type 1510 from its base and in the field, follow the steps in the Figure below:



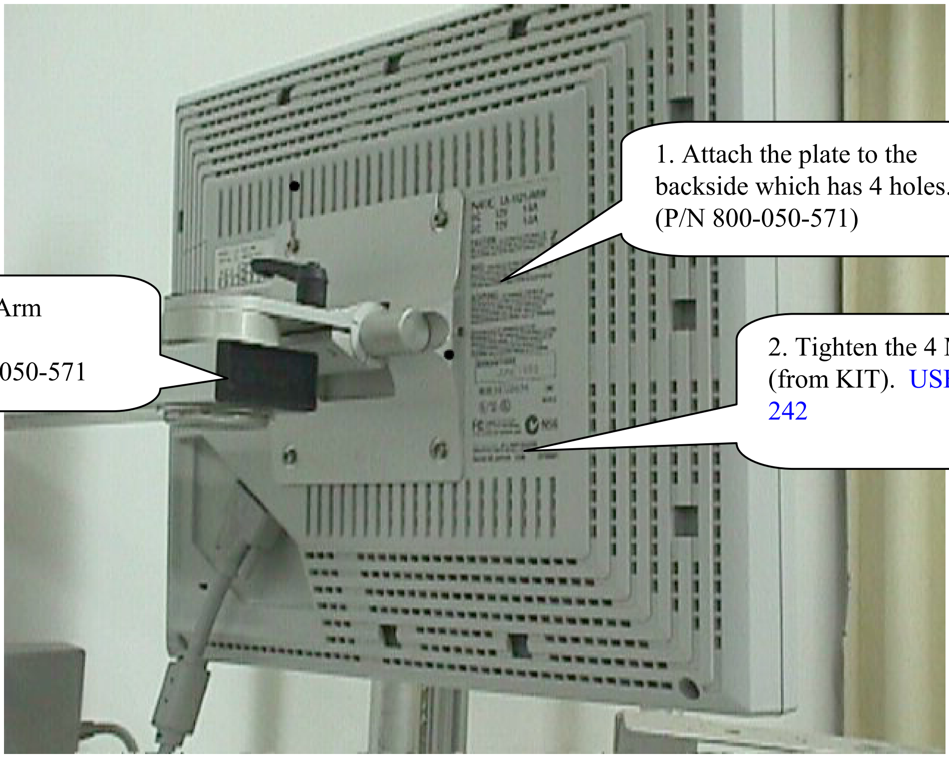
Hold the screen carefully/or put the front face on sponge.

2. Remove 4 screws.
(Can be used for installing to GCX WM)

935-823-015

To be sent to the customer

To install the support arm to the back of the LCD NEC 1510, follow the steps set out in the two Figures below:



1. Attach the plate to the backside which has 4 holes. (P/N 800-050-571)

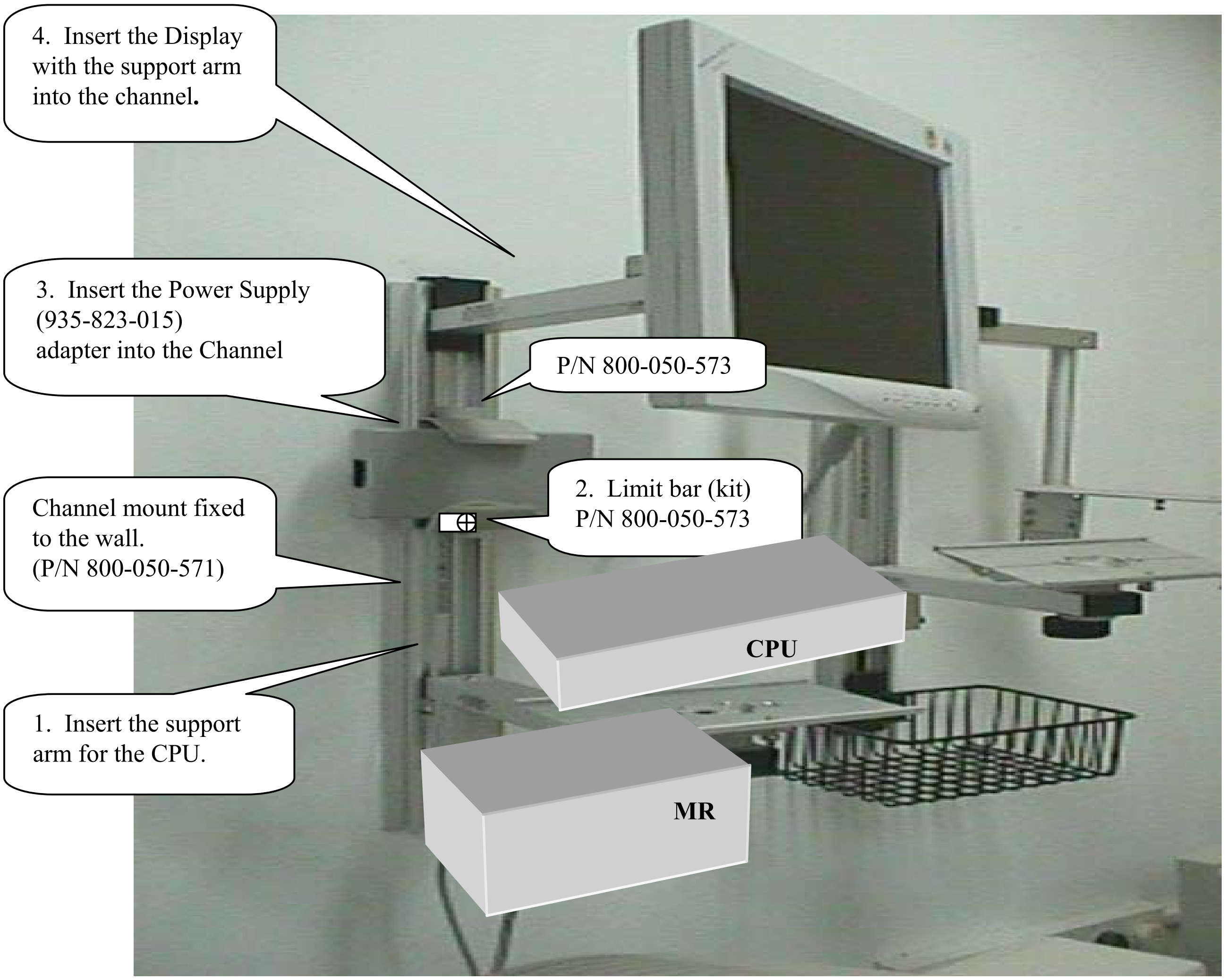
Support Arm

P/N 800-050-571

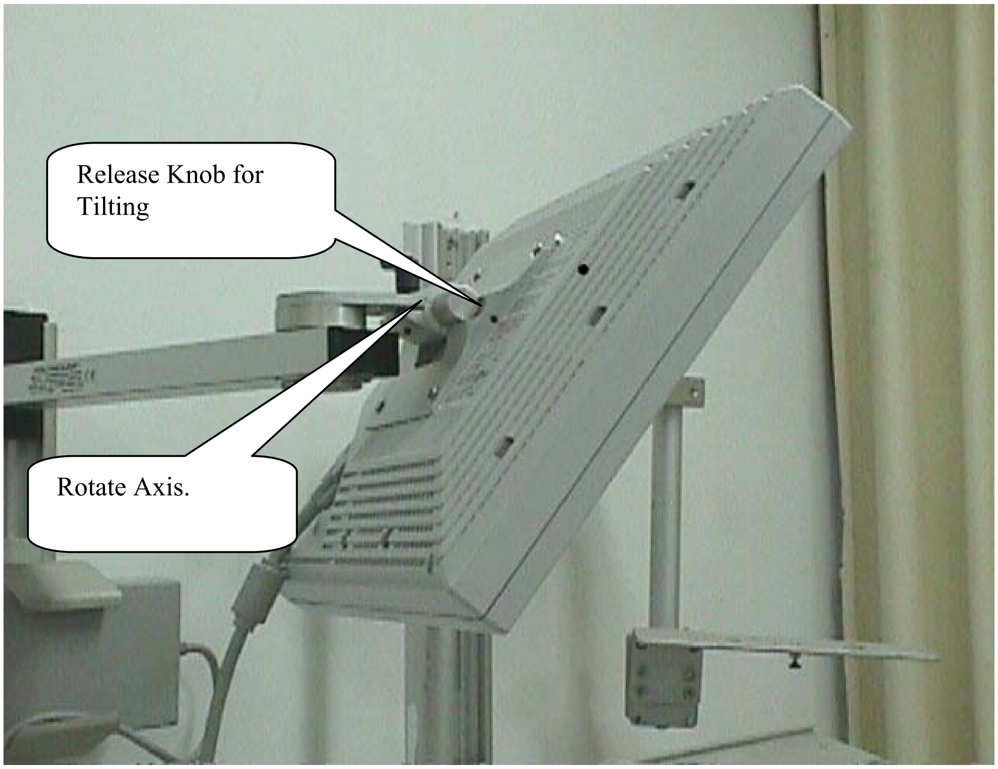
2. Tighten the 4 M4 screw (from KIT). USE Loctite 242

General Comments:

1. All components should be fixed at a height convenient to the User.
2. The Power Supply should be assembled to the clamp before inserting to the channel.
3. Ensure that all Screws and Clamps are securely fixed.
4. Connect all Power/Communication cables.
5. Test the system on completion of the above Setup.


4. Insert the Display with the support arm into the channel.
3. Insert the Power Supply (935-823-015) adapter into the Channel
P/N 800-050-573
Channel mount fixed to the wall. (P/N 800-050-571)
2. Limit bar (kit) P/N 800-050-573
CPU
1. Insert the support arm for the CPU.
MR

To Release, Rotate and Tilt the display, follow the steps in the Figure below:



Monitor Mounting

Caution: *Mennen Medical is responsible for the monitor's wall mount and shelves if and only if they were installed by Mennen Medical or by a person authorized by Mennen Medical.*

Warning: *Mennen Medical will not be responsible for the stability of the wall mounts and shelves unless checked by Mennen Medical at least once a year.*

Note: Mennen Medical will perform the required check during the warranty period.

At the end of the warranty period it is the responsibility of the hospital to provide a service call to Mennen medical service department, or to have a service contract.

Chapter 4

Upgrading Software

This chapter describes the technique employed to support Envoy software upgrades.

The proposed method attempts to resolve the various possible installation scenarios, as experienced by personnel servicing the Envoy with the various tools.

Upgrading Envoys (two methods):

- Replacing the Hard Disk.
- Upgrading using Microsoft Windows utilities.

Upgrading Main software of Envoy/Enguard/Ensemble (pages 5-12).

Upgrading the input modules and/or Module Rack (pages 13-13).

Notes:

You should check the system after upgrading!

Send to Mennen Medical Service Department, the p/n and the serial numbers of any device that you upgraded.

4.1 Upgrading Envoys

There are two methods for upgrading Envoys:

- Replacing the Hard Disk.
- Upgrading using Microsoft Windows utilities.

4.2 Replacing the Hard Disk:

Before Replacing any Envoy/Ensemble/Enguard Hard Disk, you should turn off the MPU.

Use the MCU and click shutdown before turning off, if the S.W. is >v3.3

➤ ***To remove the MPU cover:***

א. Remove the two Phillips screws located at both sides of the back panel

1. Carefully pull the cover toward the back of the unit and lift it slightly upward.
2. Place the cover where it won't be damaged or damage other equipment.

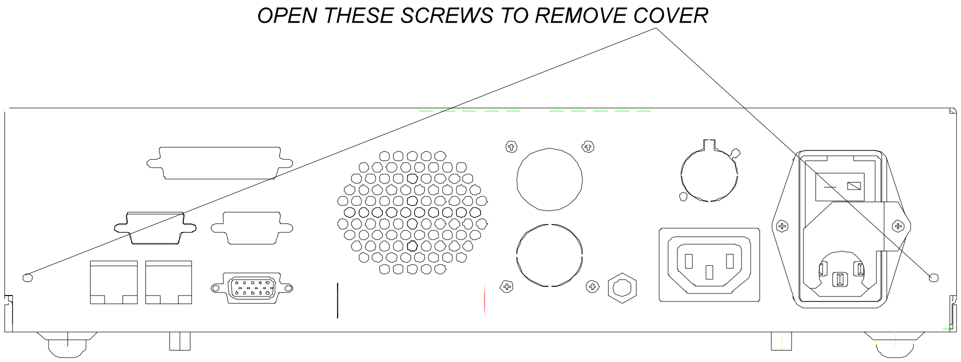


Figure A .1. Removing the Computer Cover

3. When reinstalling the cover, make sure it is properly inserted into the case.

In order to continue the Envoy software upgrade you should replace the hard disk.

➤ *To replace the Hard Disk*

Guard against static discharge damage to electronic components.

To ground yourself, do one or more of the following:
Wear an anti-static wrist band.
Work on an anti-static mat.
Ground yourself by touching the metal case of some grounded appliance. In high static environments—e.g., carpets or surrounding curtains—touching the case of the Envoy (if it is unplugged), may not completely remove a static charge.

1. Carefully disconnect the IDE cable and power cable from the rear of the hard disk (Figure A.2).

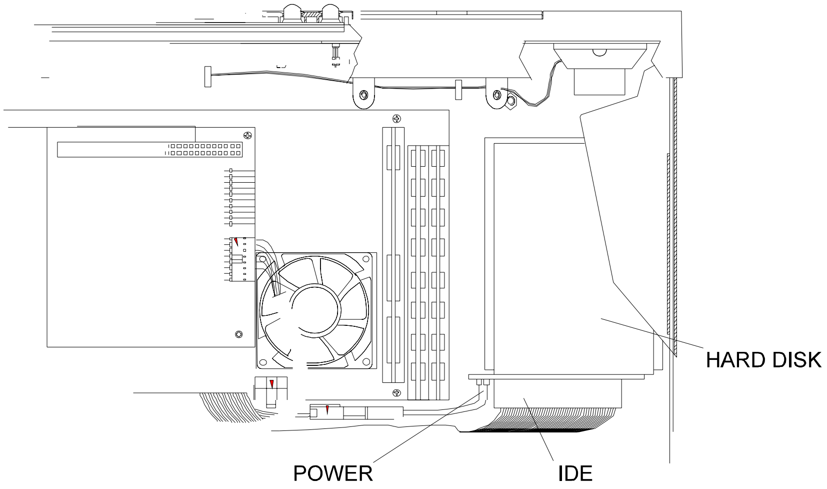


Figure A.2. Hard Disk IDE and Power Connectors

2. Turn the unit on its side.

The hard disk is attached to a bracket, which is secured by four Phillips screws through the base of the unit.

Locate these screws at the outside bottom of the case" opposite the four corners of the hard disk bracket (Figure A .3).

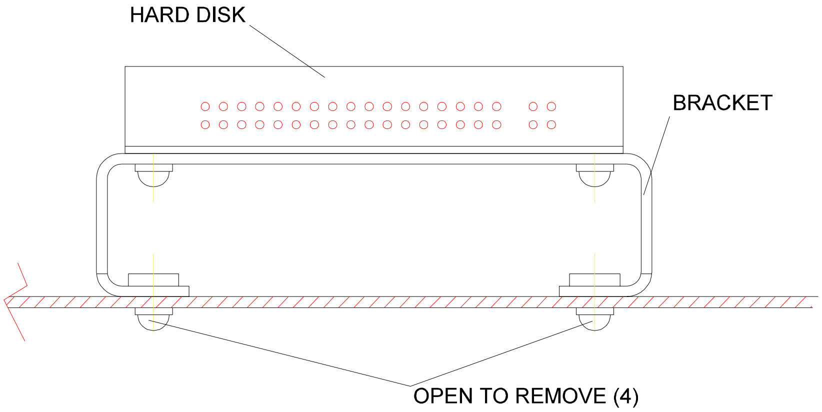


Figure A3. Hard Disk and bracket

3. Hold the hard disk in place with one hand and remove the mounting screws.

Warning! Do not remove the small screws that secure the hard disk cover in place. Opening the cover may permanently damage the hard disk.

4. Remove the old hard disk together with its bracket, and install the new hard disk and bracket in its place.
5. Reinsert and tighten the four bracket mounting screws, and lay the unit flat.
6. Carefully reconnect the IDE cable plug and DC power connector.
7. Make sure that all the connectors are firmly in place and properly installed (Figure A.4).

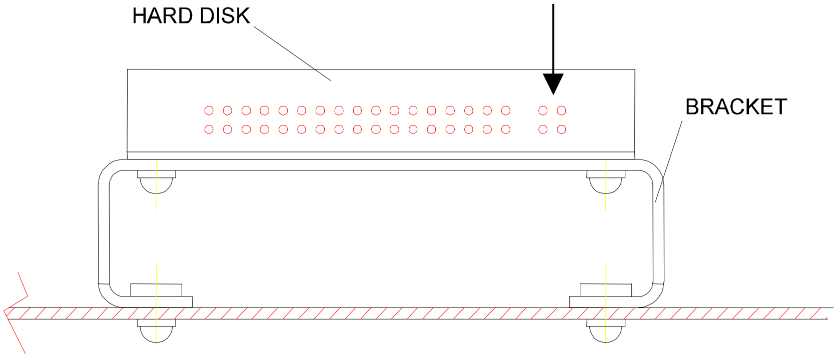


Figure A. 4 - Connectors

8. Test the new hard disk before closing the cover:

Connect the main power cable power socket.

Connect the video display monitor.

Turn ON the unit main power switch**.**

9. If the unit boots up correctly, put the cover in place.
10. If the unit does not function properly, recheck the IDE cable plug and DC power connector.

4.3 UPGRADING USING MICROSOFT WINDOWS UTILITIES

4.3.1.1 General

The Envoy / Enguard / Ensemble software consists of:

- QNX operating system
- Envoy Application software

The following instructions cover all the procedures needed to achieve a successful upgrade of one Envoy or Enguard.

4.3.1.2 Hardware Required

- Personal computer
- Modem
- Network Card with RJ45 connector
- Network Patch Cable for a connection to the switch or Network Cross Connect cable for a direct connection to an Envoy

4.3.1.3 Software Required

- Windows 95 or 98
- Internet browser software (AOL, InternetExplorer, etc.
- WS_FTP95 or compatible program
- Winzip

4.3.1.4 *Downloading a New Version from the Mennen medical FTP Site to your PC*

Use FTP program and get in by using the parameters listed below:

host name/address: : <customer id>

host type : Automatic detect
user ID : <customer id>

password : <customer password>

Select the new version file and transfer it to your laptop.

The file you have download is a compressed one in a zip format. The zip file contains one file in tar format. Run WinZip to extract the tar file. You should see now a file with the following format: **Envoy.tar.xxx** where the xxx is the version number.

4.3.1.5 Upgrading Envoys/Enguard/Ensemble

Warning**: Before upgrading Envoys, make sure there is no patient connected to the Envoy.**

4.3.1.6 Changing the IP Address of your Laptop

➤ ***To change the IP address***

1. Connect your computer to the Envoy network.
2. On your computer perform the following steps:

- Select the **Network Neighborhood** icon and press the right button of your mouse

- Select **Properties**

- In the **Configuration** area, select the **TCP/IP** that is bound to your network card.

- Click on **Properties**

- Select the "**IP Address**" tab

- Change the following properties:

IP Address = 172. 17 . 0 . 250 (250 or number higher than 180)

Subnet Mask = 255.255. 0 . 0

- Click on **OK** button twice to exit and save the new settings.
- To take effect, the PC should be rebooted.

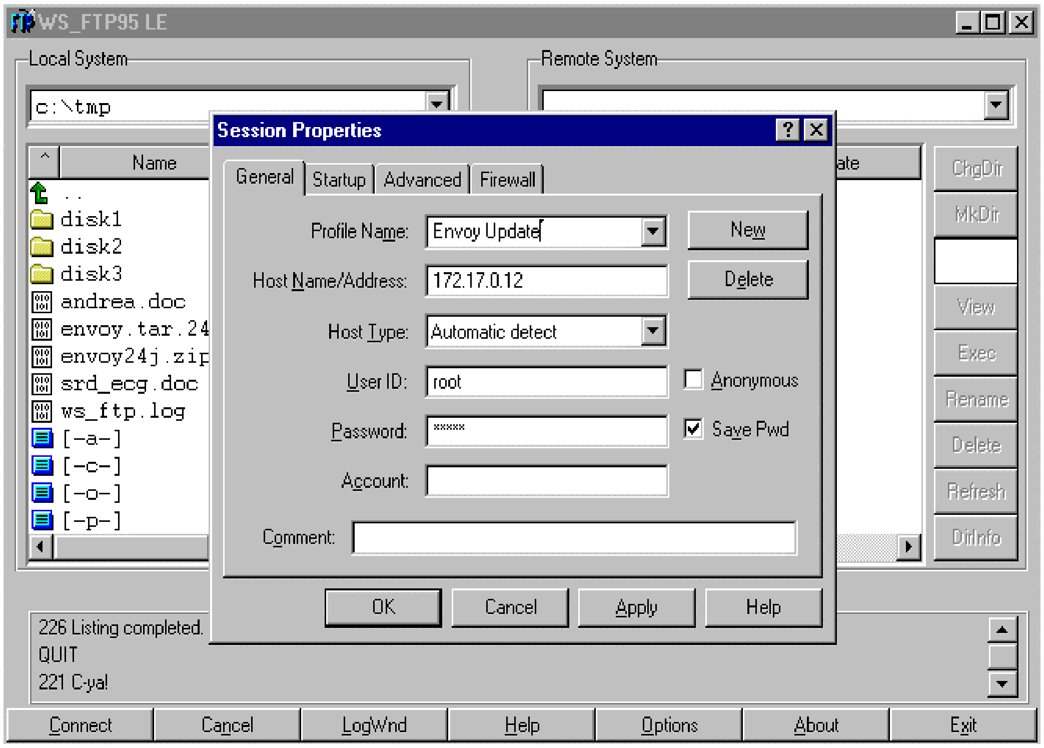
4.3.1.7 Copying the Tar file from a Laptop to an Envoy(Enguard /Ensemble)

1. Perform the following step only if the Envoy/Enguard/Ensemble version is 3.3C

If the existing S.W is not 3.3C skip to Step 2.

- Connect a local Keyboard to the **Envoy(Enguard/Ensemble)**
- Power off the **Envoy(Enguard/Ensemble)**
- Power on the **Envoy(Enguard/Ensemble)**,

- As soon as the BIOS information box appears:
- Press ”**ESC**” button three times and wait until you get: **login,**
- then type : **root** , followed by Enter. you will get QNX prompt **"#"**
- Type the following : **vedit /etc/config/sysinit.1**
- Change the line “**on –n1 –p25 inetd&**” to “**on – n1- p20 inetd&**”
- Save and Exit
- Type: **sync**
- Type: **shutdown –f**


WS_FTP95 LE
Local System
Remote System
Name
ate
ChgDir
MkDir
View
Exec
Rename
Delete
Refresh
DirInfo
Session Properties
General
Startup
Advanced
Firewall
New
Delete
OK
Cancel
Apply
Help
Connect
Cancel
LogWnd
Help
Options
About
Exit

Local System: c:\tmp

```
..
disk1
disk2
disk3
andrea.doc
envoy.tar.24
envoy24j.zip
srd_ecg.doc
ws_ftp.log
[-a-]
[-c-]
[-o-]
[-p-]
```

Profile Name: Envoy Update

Host Name/Address: 172.17.0.12

Host Type: Automatic detect

User ID: root ☐ Anonymous

Password: ***** ☑ Save Pwd

Account:

Comment:

```
226 Listing completed.
QUIT
221 C-ya!
```

2. On your PC : Using **WS_FTP95** program, create a new session called **Envoy Update**. In the **Host Name** field type the IP address of the Envoy you wish to connect to. Use **root** as User ID and **go4it** as Password. Set the “Save Password” option to save the setting for the next update.
3. In the Remote System field, select the **Envoy.tar** file (old) under **/UPDATE** directory and click on the **Delete** button to delete it.
4. Select the tar file **(**Local System field **)** and transfer it into the Envoy (Remote System field) into **/UPDATE**

directory). When the transfer is completed, click on the **Rename** button and rename the file you have just transferred from **Envoy.tar.xxx** to **Envoy.tar**

5. Upgrading Envoy Software (from v3.1x / 3.2x to v3.3x or later)

The following steps use the new version of the tar file to create a new Envoy software version .

Before you start discharge the **Envoy**, admit, and wait for 10 sec and discharge again.

➤ ***To create a new Envoy software version:***

1. On your PC Open MS-DOS prompt

Type in the following commands:

- **telnet <Envoy IP address**> (for example: telnet 172.17.0.10)
- login as # **root**
- stop the system, type # **stop**
- Type : # **touch /app/ENVOY/Need_cleanup**
- Type : # **sync**
- Type : # **sync**
- Type : # **Shutdown –f**

Wait till the Envoy system will build the new version and will scan

Check the disk automatically (This may take up to 5 minutes)

At the end of this procedure you will get the normal Envoy monitor screen

Note : At the end of the software update check the Envoy functionality and confirm that all the parameters work properly.

4.3.2 Upgrading Envoy Software v3.3x

Discharge the **Envoy**, admit, and wait for 10 sec,

and discharge the monitor again.

➤ ***To upgrade the Envoy software v3.3x:***

1. On your PC Open MS-DOS prompt
2. Type in the following commands:

- **telnet <Envoy IP address>**(for example: telnet 172.17.0.10)
- **login as root**
- **Stop the system, type # stop**
- **Type # uflags –csm (Ignore RealyMe error message)**
- **Type : # sync**
- **Type : # sync**
- **Type** : # **Shutdown –f**

3. Wait till the Envoy system builds the new version and scan-checks the disk automatically (This may take up to 5 minutes).

At the end of this procedure you will get the normal Envoy monitor screen.

At the end of the Envoy update, the Envoy automatically updates the software versions of all the modules connected to the module rack.

Note: You can skip the automatic update of the input modules by using # uflags –cs instead of # uflags –csm

Note : At the end of the software update check the Envoy functionality and confirm that all the parameters work properly.

4.3.3 Upgrading Envoy Software (v3.4x or later version)

Discharge the monitor, admit, and wait for 10 sec, and discharge the monitor again.

➤ ***To upgrade Envoy software – v3.4 or later***

1. On your PC Open **MS-DOS** prompt
2. Type in the following commands:

- **telnet <Envoy IP address >** (for example: telnet 172.17.0.10)
- login as **root**
- Run the command # **uflags –sm**

A window, requesting confirmation for the software update pops up.

3. Press '**Start'**. The Envoy reboots and the new software is installed.
4. Wait till the Envoy system builds up the new version and scan checks the disk automatically (This may take up to 5 minutes)

At the end of this procedure you get the normal Envoy monitor screen.

At the end of the Envoy update, the Envoy automatically updates software versions of all the modules connected to the module rack.

Note: You can skip the automatic update of the input modules by using # uflags –s instead of # uflags –sm

Note : At the end of the software update check the Envoy functionality and confirm that all the parameters work properly.

Notes:

1. If the Envoy is not in discharge mode, the confirmation window will be displayed once the patient is discharged.

2. If the button (start) is not pressed within two minutes, the update will start automatically.

4.4 Upgrading Enguard Software

4.4.1 Changing the IP Address of your Laptop

Follow instruction of section 4.3.1.6.

4.4.2 Copying tar file from laptop to Enguard

Follow instruction of section 4.3.1.7.

4.4.3 Upgrading Enguard Software (from v3.1 x /3.2x to v3.3x or later)

Disconnect the bed from the Enguard screen.

➤ ***To upgrade Enguard software (v3.1x to v3.3x):***

1. On your PC Open **MS-DOS** prompt
2. Type in the following commands:
   - **telnet <Enguard IP address**>(for example: telnet 172.17.0.10)
   - login as # **root**
   - stop the system, type: # stop
   - Type : # touch /app/ENVOY/Need_cleanup
   - Type : # sync
   - Type : # sync
   - Type : # Shutdown **–f**
3. Wait till the Enguard system builds the new version and scan checks the disk automatically (This may take up to 5 minutes).

At the end of this procedure you get the normal Enguard screen

***Note** : At the end of the software update check the Enguard functionality and confirm that all the parameters work properly.*

4.4.4 Upgrading Enguard Software (v3.3x)

Disconnect the bed from the Enguard screen.

➤ ***To upgrade Enguard software (v3.3x):***

1. On your PC Open **MS-DOS** prompt
2. Type in the following commands:
   - **telnet <Enguard IP address>** (for example: telnet 172.17.0.10)
   - **login as root**
   - **stop the system, type # stop**
   - **Type : # uflags –sc (ignore RealyMe error message)**
   - **Type : # sync**
   - **Type : # sync**
   - **Type** : # **shutdown -f**
3. Wait till the Enguard system builds the new version and scan checks the disk automatically (This may take up to 5 minutes)

At the end of this procedure you get the normal Enguard screen

Note : At the end of the software update check the Enguard functionality and confirm that all the parameters work properly.

4.4.5 Upgrading Enguard Software (v3.4x and up)

Disconnect the bed from the Enguard screen.

➤ ***To upgrade Enguard software (v3.4x and up):***

1. On your PC Open **MS-DOS** prompt
2. Type in the following commands:
   - **telnet <Enguard IP address>** (for example: telnet 172.17.0.10)
   - login as **root**
   - Run the command # **uflags –s**

A window, requesting confirmation for the software update pops up.

3. Press '**Start**'. The Enguard will reboot and the new software will be installed.

4. Wait till the Enguard system builds the new version and scan checks the disk automatically (This may take up to 5 minutes)

At the end of this procedure you get the normal Enguard screen

Note : At the end of the software update check the Enguard functionality and confirm that all the parameters work properly.

Note

1. If the Enguard is not in disconnect mode, the confirmation window will be displayed after disconnect.

2. If the Start button is not pressed within two minutes, the update will start automatically.

4.5 Upgrading Ensembles

4.5.1 Changing the IP Address of your Laptop

Follow instruction of section 4.3.1.6.

4.5.2 Copying tar file from laptop to Ensemble

Follow instruction of section 4.3.1.7

4.5.3 Upgrading Ensemble Software (from v3.2x to v3.3 or later)

Note: Remove all beds from the Ensemble screen, using mouse and choose disconnect Quick key for each bed.

1. On your PC Open **MS-DOS** prompt
2. Type in the following commands:
   - **telnet <Ensemble IP address>**(for example: telnet 172.17.0.10)
   - login as **root**
   - run the command : # **stop_cs**
   - Type : # **touch /app/ENVOY/Need_cleanup**
   - Type : # **sync**
   - Type : # **sync**
   - Type : # **Shutdown –f**
3. Wait till the Ensemble system builds the new version and scan-checks the disk automatically (This may take up to 5 minutes)

At the end of this procedure you get the normal Ensemble screen

Note : At the end of the software update check the Ensemble functionalityand confirm that all the parameters work properly.

4.5.4 Upgrading Ensemble Software (v3.3x/3.4x version and up)

Remove all beds from the Ensemble screen, using the mouse and choose Disconnect key for each bed.

➤ ***To upgrade Ensemble software (V3.3x and up)***

1. On your PC Open **MS-DOS** prompt

2. Type in the following commands:
   - ♦ telnet <Envoy IP address>**(for example: telnet 172.17.0.10)**
   - ♦ **login as** root
   - ♦ **stop the system, type #** stop_cs
   - ♦ **Type: #** uflags –sc **(ignore RealyMe error message)**
   - Type : # **sync**
   - Type : # **sync**
   - Type : # **Shutdown –f**
3. Wait till the Ensemble system builds the new version and will scan-checks the disk automatically (This may take up to 5 minutes)

At the end of this procedure you get the normal Ensemble screen

Note : At the end of the software update check the Ensemble functionality and confirm that all the parameters work properly.

4.6 Upgrading Input Modules Software

Mennen Medical releases periodically new input module software versions without changing the Envoy version itself..

In such occasions Mennen Medical will place a new module version on the FTP site.

The following is the procedure for transfer of the module software from the FTP site to your modules:

Warning:

New software versions for input modules may only be compatible with some Envoy software versions and not with other.

Before loading a new software version to a module make sure that it is compatible with the module hardware and with the Envoy software version.

Check with Mennen Medical service department the compatibility between module and Envoy versions

➤ ***To upgrade Input Modules software***

1. Download the new module software version from the FTP site.
2. On your PC use FTP program and get in by using the parameters listed below:

   host name/address: <customer id>

   host type : Automatic detect

   user ID : <customer id>

   password : <customer password>

3. Select the new version file and transfer it to your laptop. It's recommended to save it under Envoy Module Software directory.

4.6.1 Changing the IP Address of your Laptop

Follow instruction of section 4.3.1.6.

4.6.2 Copying the Modules Files to an Envoy

➤ ***To copy Module files:***

1. Using WS_FTP5 program, create a new session called **Envoy Update**.

2. In the **Host Name** field type the IP address of Ensemble you wish to connect to. Use **root** as **User ID** and **go4it** as **Password**.
3. Select the “**Save Password**” option.
4. Select the modules file (Local System) and transfer it into the Envoy (Remote System) - into /app/ENVOY/download directory.

The file that you have just transferred should be with the same format as the old **module** software file.

4.6.3 Upgrading Modules Software

Automatic: This section applies only to Envoys with version 3.3 and later.

Note: For Envoy software version below V3.3 see Manual mode.

➤ ***To upgrade Module software automatically:***

1. On your PC Open **MS-DOS** prompt
2. Type in the following commands:
   - telnet <Envoy IP address> (for example, 172.17.0.10)
   - login as root
   - run the command # uflags -m

If the Envoy is in discharge mode a window, requesting confirmation for the software update, pops up.

3. Press ‘**Start**’. The Envoy scans the modules existing in the Envoy and updates the modules that have a new version.

Note*: If the Envoy is not in discharge mode, the confirmation window is displayed once the patient is discharged.*

Note: *If the button is not pressed within two minutes, the update will start automatically.*

➤ ***To manually upgrade Module software:***

Note: Manual Upgrade can be performed for all Envoy software versions

1. Set the Envoy to **Discharge mode**.
2. Press setup key
3. Select system setup
4. Enter the password

5. Select software version
6. Select the software version that you transferred
7. Select the module that you wish to upgrade and confirm.

Note *: At the end of the software update check the Envoy functionality and confirm that all the parameters are working properly.*

Chapter 5

SETTING UP THE SYSTEM

This chapter includes instructions for configuring the following ***Envoy*** parameters:

- Store Diagnostic File
- Date & Time Setup
- General Settings
- Alarm Volume & Controls
- Sound Event
- Default Alarm Limits
- Event Setup
- NIBP Leakage test
- Vital Sign (VS) Setup
- Parameter Hierarchy
- Monitor Profiles
- Admit by Default
- Report Setup
- Automatic Reports
- Network Setup
- Recorder Setup
- Trends Setup
- Quick Keys
- Tabular Charts
- Software Version
- Parallel Port Setup
- Enmove interface setup
- Change Password

- Check Disk
- Permission Editor
- Remove Saved Patients

5.1 Introduction

System Setup enables configuration of global controls, such as setting the date and time or defining the default language for the Envoy. It is also used to define default values for all monitored vital signs. The Envoy is configured at the factory with Mennen default values which can be changed as needed by your hospital or department. Access to the System Setup menu is limited to authorized personnel such as a System Administrator or Hospital Biomedical Engineer possessing a pre-defined password.

5.1.1 Accessing the System Setup Menu

From the **System Setup** menu, you can access the following dialog panels:

- **Store Diagnostic File**

  Use this panel to store a diagnostic file in the event of a malfunction or failure of the Envoy. See Appendix for instructions on how to download the diagnostic files and send them to the Service dept. of Mennen Medical.

- **Date & Time Setup**

Use this panel to set the date and time and to set time display formats for the Envoy bedside monitor. See “Date & Time Setup” on page 5-7.

- **General Settings**

Use this dialog panel to define general information, such as the hospital name and parameters controlling general panel behavior. See “General Settings” on page 5-9.

- **Alarm Volume & Controls**

Use this panel to define general alarm-related parameters, such as alarm volume, color scheme, etc. See “Alarm Volume and Controls” on page 5-12.

- **Sound Event**

Use this panel to assign audio messages to various events. See “Sound Event” on page 5-15.

- **Default Alarm Limits**

Use this panel to set new default alarm limits for all monitored vital signs. See “Default Alarm Limits” on page 5-17.

- **Event Strip**

Use this panel to prepare or modify a list of Event Strip Labels, and to define the response of the Envoy to the activation of the Mark Event key.

- **Leakage Test**

Use this panel to perform Leakage test of the NIBP module and cuff. The test is password protected (after Event Strip)

- **Vital Sign (VS) Setup**

Use this panel to set default parameters and units for each vital sign available for monitoring in the Envoy bedside monitor. These include alarm parameters and other parameters specific to the monitored vital sign. See “Vital Sign (VS) Setup” on page 5-18.

- **Parameter Hierarchy**

Use this panel to present the Hierarchy of VS parameters. See “Parameter Hierarchy” on page 5-51.

- **Monitor Profiles**

Use this panel to preset and label monitoring profiles. See “Monitor Profiles” on page 5-52.

- **Admit By Default**

Use this option to return the Envoy to default parameters. See Admit By Default on page 5-56.

- **Report Setup**

Use this dialog panel to define and edit report formats. See “5.8 Report Setup” on page 5-57.

- **Automatic Reports**

Use this panel to set the time and type of automatic report printout on the network printer. See Automatic Reports on page 5-63.

- **Network Setup**

Use this panel to configure devices, such as monitors, printers, etc. on the network. See “Network Setup” on page 5-64.

- **Recorder Setup**

Use to define default recording options. See “Recorder Setup” on page 5-65.

- **Trends Setup**

Use to set the scales of the graphic trend for each vital sign. See Trends Setup on page 5-78.

- **Quick Keys**

Use this panel to prepare “QuicKeys” for single button access to monitoring functions. See “Quick Keys” on page 5-67.

- **Tabular Charts**

Use this panel to create User Defined Charts, customized to the specific needs of a unit or patient. See “Tabular Charts” on page 5-69.

- **Software Version**

The Software Version panel displays the software version of all modules located in the Module Rack and manages loading of new software to the modules. See “Software Version” on page 5-73.

- **Parallel Port Setup**

Use this panel to configure alarm output from the Envoy to external devices; and the alarm input for external devices (e.g. Infusion Pump) to the Envoy via the parallel input/output port. See “Parallel Port Setup” on page 5-xx

- **Enmove interface setup**

For display of Envoy on Ensemble EN, Central for both Enmoves and Envoys -- Setting of Envoy/Enmove Network Number.

- **Change Password**

Use this panel to define a new password for entering the System Setup menu. See “Change Password” on page 5-74.

- **Check Disk**

Check disk is a technical procedure resets all parameters to factory default settings.. This panel is for use by authorized service personnel only. See “Check Disk” on page 5-75.

- **Permission Editor**

Use this panel to define which Envoy menu options are available. See “Permission Editor” on page 5-76.

- **Remove Saved Patients**

Use this panel to access a list of all the patient data saved by the Envoy and to remove some or all of the saved files. See “Remove Saved patients” on page 5-

***Note**: In the **System Setup** menu, some of the dialog panels can be accessed only when the Envoy is **not** currently monitoring a patient. In this case, if a patient is being monitored, he/she must first be discharged, meaning that monitoring of that patient must be stopped.*
*On the other hand, some of the dialog panels can be accessed only when a patient **is** currently being monitored..*

See Table 1 below for the access capabilities in the dialog panel:

	Patient Discharged	**Patient Monitored**
Store Diagnostic File	++	++
Date & Time Setup	++	__
General Settings	++	__
Alarm Volume & Controls	++	++
Sound Event	++	++
Default Alarm Limits	++	__
Event Setup	++	++
Leakage Test	---	++
Vital Sign (VS) Setup	++	__
Parameter Hierarchy	__	++
Monitor Profiles	__	++
Admit By Default	++	__
Report Setup	++	++
Automatic Reports	++	++

Network Setup	++	++
	Patient Discharged	**Patient Monitored**
Recorder Setup	++	++
Trends Setup	++	++
Quick Keys	—	++
Tabular Charts	++	++
Software Version	++	—
Enmove interface setup	++	++
Change Password	++	++
Check Disk	++	—
Permission Editor	++	++

Table 1: Access capabilities in the dialog panel

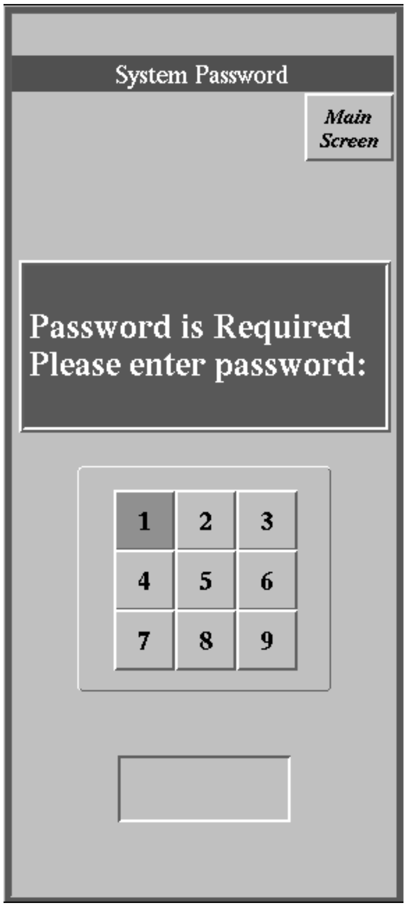
➢ ***To discharge a patient:***

1. Press the **Setup** key to access the **ADT** menu and select **Discharge Patient**.
2. A window appears informing you that all patient data will be erased and asking you to confirm patient discharge.
3. Press **Discharge** to stop patient monitoring and erase patient data. The Envoy bedside monitor is now ready to admit a new patient
   –or–
   Press **Cancel** to cancel the discharge, close the panel and return to the main screen display.

Once the patient has been discharged, all defined **Monitor Profile** Admit Keys appear on the now blank display screen. You are now ready to access the **System Setup** menu.

➢ ***To access the System Setup menu:***

4. Press **Setup** button, the **Setup** menu is displayed.
5. Turn the QuicKnob until the **System Setup** button is highlighted and press. The **System Password** panel appears requesting the password.



Password is Required
Please enter password:

Figure 5-1 The System Password Dialog Box

6. Enter the correct password. The **System Setup** menu is displayed.

5.2 Date & Time Setup

This panel enables you to set the date and time and to set time display formats for the Envoy bedside monitor.

5.2.1 Time Server (**implemented in Envoy SW Version 3.4).**

The Date and Time setting of the Envoy monitor can be set on each monitor individually, or, if the monitors are connected to a LAN, by one device defined as the **Time Server.**

Only ONE device on the network (e.g. Envoy, Enguard, or Ensemble) can function as the Time Server. If one of the devices is set to become the Time Server, then the Date and Time setting on all other devices will be disabled and the time can be changed only on the Server device.

The Time Server sends a time signal every 30 seconds to all the devices on the network.

Envoy monitors that are in the Discharge mode, reset their time to the time sent by the server. Envoys that are in the process of monitoring a patient, will not respond to the Time Server.

The Enguard always responds to the Time Server and resets its own time, but this will not affect the device that the Enguard is viewing.

The Ensemble always responds to the Time Server and will reset its own time, but this will not affect the device/s it is viewing.

➢ ***To create a Time Server:***

7. Select System setup (password protected) in the Setup menu.
8. Select Date & Time Setup in the System setup menu.
9. In the Time Server Master, set the “Time server Master” to ON (Green).
10. Use the **Current Date & Time** box to change the time and/or date.

Note: If there is a Time Server Master on the network, then:

All other devices will show the Device ID and the Device name of the Time Server Master on the “Date & Time” panel.

The “Current Date & Time” box will show the date & time, but will be dimmed and not accessible.

The **Date and Time Setup Panel** is divided into 3 major areas (**note -** the function **Daylight Saving Date** is not active):

5.2.2 Current Date and Time

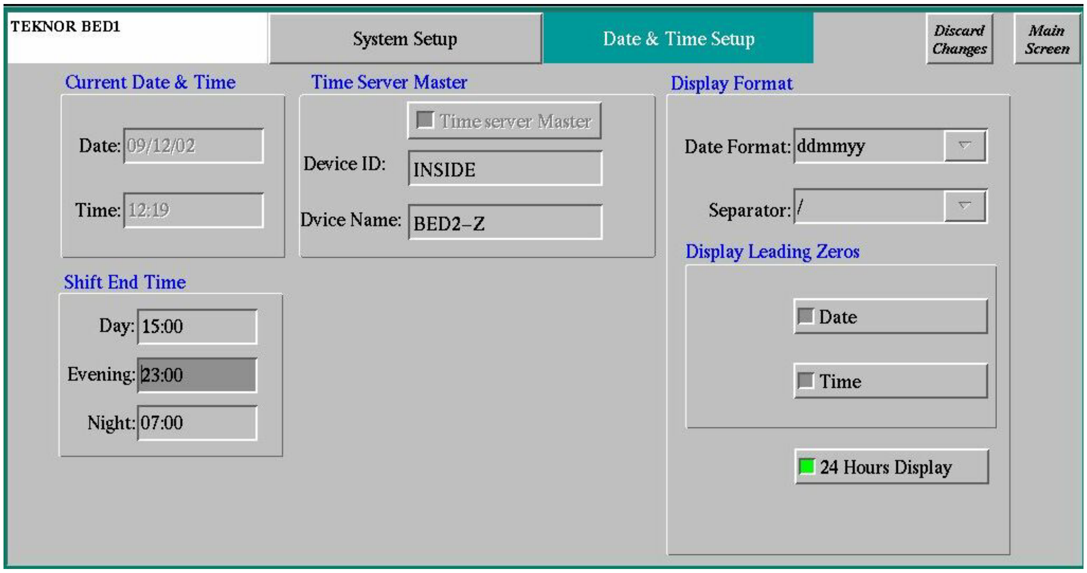
As the name implies, the current date and time are set in this area.

5.2.3 Shift End Time

Specify the end times for each work shift according to what is standard in your department or hospital. The end time defined for the shift also indicates the start time of the following shift. For example, if the Day shift ends at 15:00, this indicates that the Evening Shift begins at 15:00. The **Date and Time Setup** panel provides space for three shifts: **Day**, **Evening** and **Night**.

5.2.4 Display Format

In the **Display Format** area, you define how the time and the date appear on the main screen display.



Current Date & Time

Date: 09/12/02

Time: 12:19

Time Server Master

☐ Time server Master

Device ID: INSIDE

Dvice Name: BED2–Z

Shift End Time

Day: 15:00

Evening: 23:00

Night: 07:00

Display Format

Date Format: ddmmyy

Separator: /

Display Leading Zeros

☐ Date

☐ Time

☑ 24 Hours Display

Figure 5-2 The Date & Time Setup Panel

➢ ***To set the date and time display formats:***

11. Select the **Date** textbox. A calendar panel is displayed.
12. Using the QuicKnob, select the day, month and year.

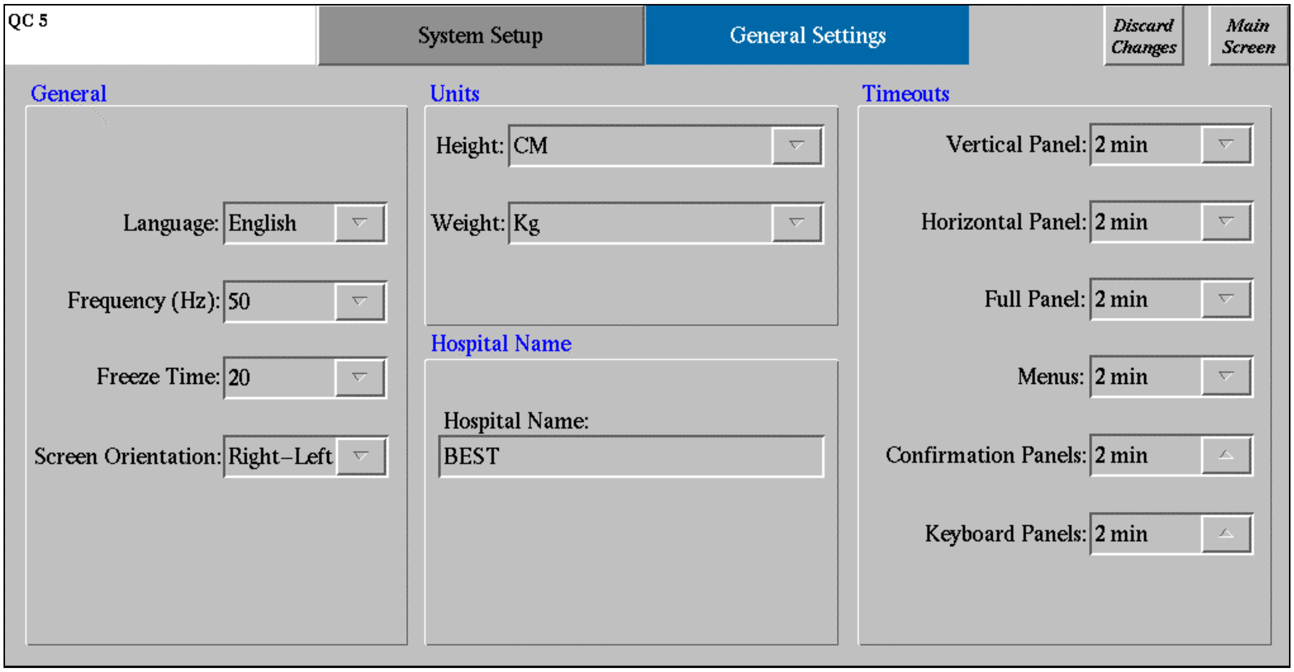
13. Turn the QuicKnob until the monthly calendar is highlighted and press. Now the calendar is selected.
14. Begin turning the QuicKnob again to move through the days of the month. When the correct day is highlighted, press the QuicKnob.
15. Turn the QuicKnob until one of the arrows on the month indicator is highlighted. The arrow on the right, when selected, advances the months, the arrow on the left goes back. Press to select the correct month.
16. Turn the QuicKnob until the year is highlighted and press to select. Turn the QuicKnob clockwise to advance in 10-year steps. Press and turn the QuicKnob to advance in one-year steps. Turn the QuicKnob counter-clockwise in the same manner to go back.
17. Select **Cancel Changes** to close the panel without applying the changes
    –or–
    Select **Accept** to apply the changes and return to the **Date and Time Setup** panel.
18. Select the **Time** area. An Hour/Minute panel is displayed.
19. Select **Hours**/**Minutes** and turn the QuicKnob to set the time. Turning the QuicKnob clockwise goes forward in time. Turning the QuicKnob counter-clockwise goes back.
20. Once you have set the minutes/hours, you must press the QuicKnob again to go on to the next parameter.
21. Under **Shift End Time**, select **Day**, **Evening**, or **Night**. The **Hour**/**Minute** panel is displayed. Enter the shift end time in the same way you set the time for the **Time** area.
22. Under Display Format:
23. Select **Date Format**. A drop-down list is displayed. There are three available options: **ddmmmmyy**, **ddmmyyyy**, or **mmddyy**. The factory default is **mmddyy**.
24. Select **Separator**. The **Keyboard** panel is displayed. Select a character to be used by the system as a separator between elements of a date (such as "." or "/"). Only a single character can be selected.
25. Under **Display Leading Zeros**, select the **Date** or **Time** checkbox to activate display of a leading zero (for example, 01/01/98, or 01:30). Clear the checkbox to deactivate.

26. Select the **24 Hour Display** checkbox to activate display of time in a 24-hour format (00:00 - 24:00). Clear the checkbox to have time displayed in a 12-hour format (12A.M. AND 12 P.M.)
27. When the **24 Hours Display** checkbox is cleared, the **Suffix** (am/pm) checkbox is enabled. Select to display the suffix AM or PM after the time when time is displayed in 12-hour format. Clear the checkbox to remove the suffix.
28. Select **Discard Changes** to close the panel without applying any changes,
    –or–
    Select **Main Screen** to apply the changes and close the panel.

5.3 General Settings

Use this dialog panel to set parameters that:

- Affect general panel behavior (timeouts, etc.)
- Define general information, such as the name of the hospital, the interface language for the panels, default measurement units, etc.



Language: English
Frequency (Hz): 50
Freeze Time: 20
Screen Orientation: Right–Left

Height: CM
Weight: Kg

Hospital Name: BEST

Vertical Panel: 2 min
Horizontal Panel: 2 min
Full Panel: 2 min
Menus: 2 min
Confirmation Panels: 2 min
Keyboard Panels: 2 min

Figure 5-3 The General Settings Dialog Panel

The General Settings panel is divided into four areas; General, Units, Timeouts, and Hospital Name.

5.3.1 General

Under the General area, you can configure the following parameters:

- **Language**

  Defines the language used for display purposes and as the interface language on the dialog panels. You can choose from a provided list of languages - currently, English and French are supported. The factory default language is English.

- **Frequency**

  Defines the monitor frequency in Hertz (Hz). You can select either 50 or 60Hz.

- **Freeze Time**

  By pressing the Freeze button on the front panel, a user can stop updating of all waveform information displayed on the main screen for a period of time which is defined here. The available freeze times are 10, 20, or 30 seconds.

- **Screen Orientation**

  Defines the location in which numerical values and waveforms are displayed on the main screen. There are two options available; Right-Left or Left-Right.

5.3.2 Units

Under the Units area, you can define the default measurement units used for patient's height and weight.

- **Height**

The units of measurement available are; CM (centimeters), or IN (inches). The factory default is CM.

- **Weight**

Available units of measurement are; Kilograms (Kg), Grams (Gr), Pounds (Lb), or Pounds and Ounces (Lb & Oz.). The factory default is Kg.

5.3.3 Timeouts

Under the Timeouts area, you can define the period of time which elapses from the last time an action was performed in a panel or menu to the time it is automatically closed by the system and disappears from the main screen display. The timeout can be defined for each type of panel and for menus. The following panels can be configured for timeout; Vertical Panels, Horizontal Panels, Full Panels, Confirmation Panels, Keyboard Panels and Menus. The available timeout options for all types of panels are; None (panel or menu will not automatically close) 1 min., 2 min., 4 min., or 10 min. The factory default timeout for all panel types is 2 min.

5.3.4 Hospital Name

Under Hospital Name, you can enter the name of the hospital. This name will then appear in the Header area on the main screen display.

5.3.5 Setting the General Settings Panel

The General Settings panel can be accessed from the System Setup menu, or, if you are currently in another System Setup panel, from the drop-down menu list to the right of the back menu button ("System Setup") on the top of the screen.

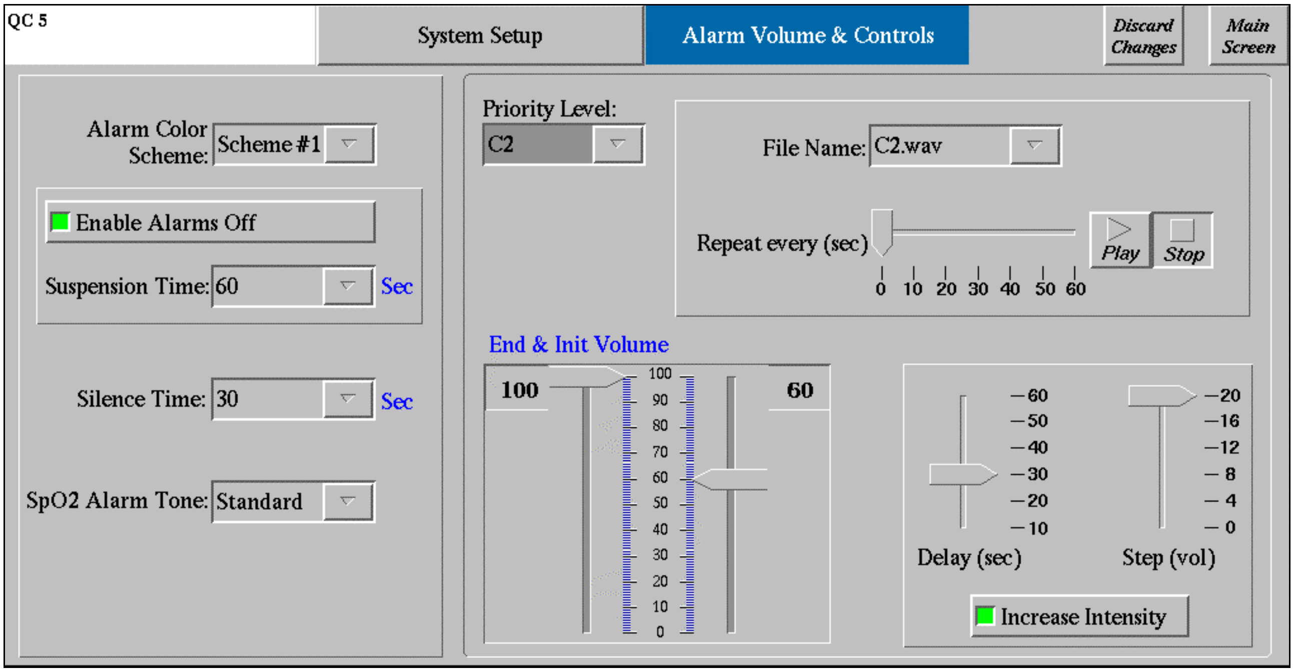
➢ ***To define General Settings:***

1. Under General, select the required Language, Frequency, Freeze Time, and Screen Orientation.

2. Under Charts, select the Default Frequency.
3. Under Units, select the required default measurement units for the patient's height and weight.
4. Under Timeouts, select the required timeouts for the various panels and menus.
5. Under **Hospital Name**, select the **Hospital Name** text box. The alphanumeric keyboard appears. Using the QuicKnob, enter the name of the hospital and close the keyboard.
6. Select **Discard Changes** to close the panel without applying any changes
   –or–
   select **Main Screen** to apply your changes and return to the blank screen.

5.4 Alarm Volume and Controls

Use this panel to define general alarm-related parameters, such as alarm volume, color scheme, etc. These parameters are defined for each alarm priority level, enabling the alarm response for each alarm priority to be unique. For a more detailed description of Alarms, including alarm priority and notification, refer to Chapter 7, “Alarms”, in the *Envoy Operating Manual*.


QC 5
System Setup
Alarm Volume & Controls
Discard Changes
Main Screen
Repeat every (sec)
0 10 20 30 40 50 60
Play
Stop
100 90 80 70 60 50 40 30 20 10 0
60 50 40 30 20 10
20 16 12 8 4 0
Delay (sec)
Step (vol)

Alarm Color Scheme: Scheme #1

🟩 Enable Alarms Off

Suspension Time: 60 Sec

Silence Time: 30 Sec

SpO2 Alarm Tone: Standard

Priority Level: C2

File Name: C2.wav

End & Init Volume: 100 60

🟩 Increase Intensity

Figure 5-4 The Alarm Volume & and Controls Panel

The panel is divided into two major areas. Parameters common to all alarms are located on the left of the panel. These parameters include; **Alarm Color Scheme**, **Suspension Time**, **Silence Time**, and **SpO2 Alarm Tone**. On the right side of the panel, parameters specific to each alarm priority are set. These fields include; **File Name**, **Repeat Every (sec)**, **End and Init Volume**, **Delay**, **Step** and **Increase Intensity**. These parameters remain disabled until an alarm priority is selected. A description of each **Alarm Volume and Control** panel field follows.

5.4.1 Alarm Color Scheme

The Envoy supports two alarm color schemes. For a description of these schemes, refer to Chapter 7, “Alarms”, in the *Envoy Operating Manual.* The available options are **Scheme #1** or **Scheme #2**. The factory default is **Scheme #1**.

5.4.2 Enable Alarm Off

Depending on the regulation of each country or institution, the option to be able to put alarms off can be allowed by activating “**Enable Alarm Off**” or can be prevented by not activating “**Enable Alarm Off**”.

When the **Alarms Off** key on the Envoy front panel is pressed, all detection of clinical alarms is disabled for a pre-defined period. Technical alarms are still detected and visually displayed in the appropriate area on the main screen.

Under **Suspension Time**, you can select the period of time that **Alarms Off** is in effect when the **Alarms Off** button is pressed. The available options are; **30**, **60**, **90**, and **120** seconds. **Alarms Off** can be configured to be permanent (where allowed by law). When the **Enable Alarms Off** checkbox is selected, the option “**Permanent**” is added to the available options under **Suspension Time**. The factory default suspension time is 60 seconds.

5.4.3 Silence Time

When pressed, the **Silence** key terminates any audio alarms active at that moment for a predefined period which you can set under **Silence Time**. The available options are; **30**, **60**, **90**, and **120** seconds. The factory default is **30** seconds.

5.4.4 SpO2 Alarm Tone

Defines whether SpO2 alarms are indicated with the same standard tone as other alarms of the same priority or whether they are indicated with a tone unique to SpO2. The available options are **Standard**, or **Unique**.

5.4.5 Priority Level

Defines the alarm priority level for which you wish to define alarm volume parameters. The available priority levels are; **C1, C2, C3, C4, T1, T2**, and **SpO2**. When you select an alarm priority level, the following fields are enabled:

- **File Name**

Defines the .WAV file (sound file) which supplies the alarm tone for the selected alarm priority. The available options are; **C1.WAV, C2.WAV, C3.WAV, T1.WAV, T2.WAV** and **SpO2.WAV**. Each file corresponds to the alarm priority of that name.

- **Repeat Every (sec)**

Defines the time period after which an alarm is repeated (every 10 seconds, every 20 seconds, etc.). The available options are; 10, 20, 30, 40, 50, and 60 seconds. You can press the Play button to sample the selected alarm tone. The factory default values are as follows:

C1, C2, C3 and C4 - 20 seconds

T1 - 30 seconds

T2 - 60 seconds

SpO2 - 5 seconds

***Note**: A repeat time of 0 seconds indicates that the alarm tone is continuous.*

- **End and Init Volume**

Sets the volume of the alarm tone when the alarm is first triggered (Initial Volume) and the maximum volume the alarm can reach until responded to (End Volume). The alarm volume gets progressively louder until it reaches the maximum level, then remains at that maximum level until someone responds. **End and Init Volume** is set on a scale of 0-100. Sliders are provided to set the volume. The left slider controls the end (maximum) volume and the right slider controls the init (initial) volume.

- **Delay (sec)**

Sets the time delay (in seconds) until the alarm increases in volume. **Delay** is set on a scale of 10-60.

- **Step (vol)**

Sets the increase in alarm volume after each delay. **Step** is set on a scale of 0-20 (in units of 4).

- **Increase Intensity**

Select this checkbox to enable increase in alarm volume. If this option is disabled, the alarm tone remains at its initial level of volume.

5.4.6 Setting the Alarm Volume & Control Panel

You can access the **Alarm Volume & Control** panel from the **System Setup** menu.

➢ ***To set Alarm Volume and Controls:***

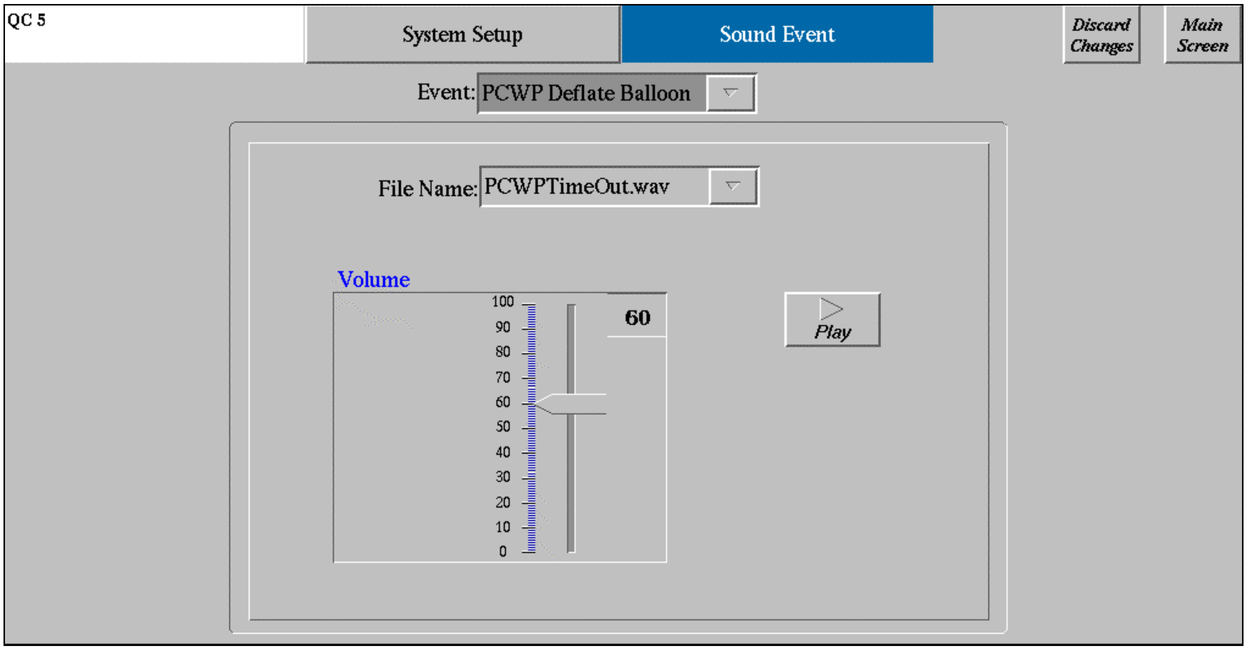
1. Select the required **Alarm Color Scheme**.
2. Select or clear the **Enable Alarm Off** checkbox, as required.
3. From the drop-down menu, select the required Suspension Time for the alarm.
4. From the **Silence Time** drop-down menu, select the alarm silence time.
5. From the **SpO2 Alarm Tone** drop-down menu, select the type of alarm tone for SpO2 alarms.
6. From the **Priority Level** drop-down menu, select the alarm priority level to be configured.
7. From the **File Name** drop-down menu, select the alarm tone .WAV file for the selected priority level.

8. Set the **Repeat Every (sec)** scale by moving the slider to the required time period. Select **Play** to hear a sample of the alarm tone. Select **Stop** to end the playback of the alarm tone.
9. Under **End and Init Volume**, set the left slider to the maximum alarm volume and the right slider to the initial alarm volume.
10. Set the **Delay** slider to the required delay (in seconds).
11. Set the **Step** slider to the required number of steps for each alarm volume increase.
12. Select the **Increase Intensity** checkbox to activate this function. Clear the checkbox to deactivate.
13. Press **Discard Changes** to close the panel without applying any changes made
    –or–
    Press **Main Screen** to apply the changes and exit to the main screen.

5.5 Sound Event

Sound events are audio messages that are heard when certain events occur. Sound files are supplied for the following events:

- When performing cardiac output, the message “Inject now” is heard at injection time (CO Inject.wav).
- When performing Wedge Pressure procedure (PCWP), the audio message “Deflate balloon” is heard when it is time to deflate the balloon (PCWPTimeOut.wav).
- When starting up the computer (StartUp.wav).
- NIBP Success (NIBP Success.wav).
- NIPB Fail (NIPB Fail.wav).
- Use the Sound Event panel to assign sound files to events at the Envoy, and to define the volume of the sound.

●

QC 5
System Setup
Sound Event
Discard Changes
Main Screen
Volume
100
90
80
70
60
50
40
30
20
10
0
Play

Event: PCWP Deflate Balloon

File Name: PCWPTimeOut.wav

60

Figure 5-5 The Sound Event Panel

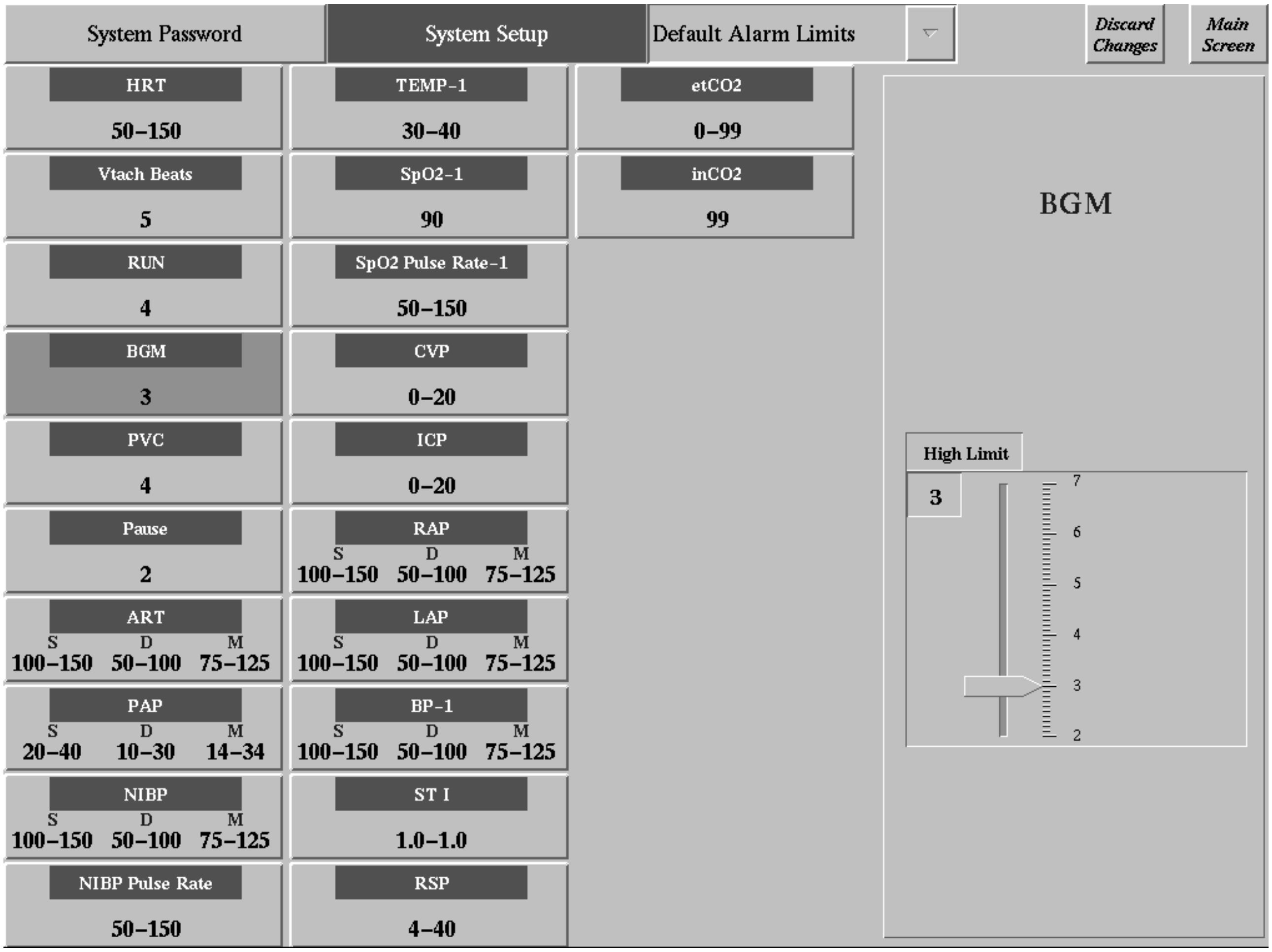
➢ ***To configure sound events:***

1. From the **System Setup** menu, select **Sound Event**. The **Sound Event** panel is displayed.
2. In the **Event** list, select the event to which you want to assign an audio message.
3. Under the **File Name** list appear all sound files, including technical and clinical alarms. Select the sound file that will supply the sound for the selected event.
4. Under **Volume**, set the required volume, and click **Play** to test the sound file.
5. Click **Main Screen** to save settings and close the dialog box.

Note: *Factory default setting is for Volume = 60 for* ***Inject Now*** *and* ***Deflate Balloon****, and Volume = 0 for all other events.*

5.6 Default Alarm Limits

Each vital signs available for monitoring appears as a button on the **Default Alarm Limits** panel. The current alarm limits for each vital sign are also displayed on the button. Select a vital sign. The appropriate scale is displayed where you can set new default alarm limits for the selected vital sign. You can select Fixed or Dynamic Alarm Limits. When Dynamic Alarm Limits is selected, the alarm limits change according to the patient's vital signs, when **Set to Default** is activated.



HRT 50–150
Vtach Beats 5
RUN 4
BGM 3
PVC 4
Pause 2
ART S D M 100–150 50–100 75–125
PAP S D M 20–40 10–30 14–34
NIBP S D M 100–150 50–100 75–125
NIBP Pulse Rate 50–150
TEMP-1 30–40
SpO2-1 90
SpO2 Pulse Rate-1 50–150
CVP 0–20
ICP 0–20
RAP S D M 100–150 50–100 75–125
LAP S D M 100–150 50–100 75–125
BP-1 S D M 100–150 50–100 75–125
ST I 1.0–1.0
RSP 4–40
etCO2 0–99
inCO2 99
High Limit 3

Figure 5-6 The Default Alarm Limits Panel

➢ ***To set default alarm limits:***

1. Turn the QuicKnob until the required vital sign is highlighted and press. The appropriate options and scale are displayed on the right side of the dialog panel.
2. Under **Default Type**, select **Fixed** or **Dynamic**.
3. Select **Pressure Type** (for BPs).

4. Select the required limit (high or low), highlight the required slider with the QuicKnob and turn the QuicKnob clockwise or counter-clockwise to move the slider to the required alarm limit. Press in the QuicKnob to set the limit.
5. When done, press the **Escape** button on the front panel to return to the **Vital Sign** list.
6. Repeat steps 1-5 until you have set alarm limits for all required vital signs.
7. Select **Discard Changes** to close the panel without applying any changes,
   –or–
   Select **Main Screen** to apply the changes and close the panel.

5.7 Event Setup

Use the Event Setup panel to create or modify Event labels, and to determine the response to activation of the "Mark Event" key .

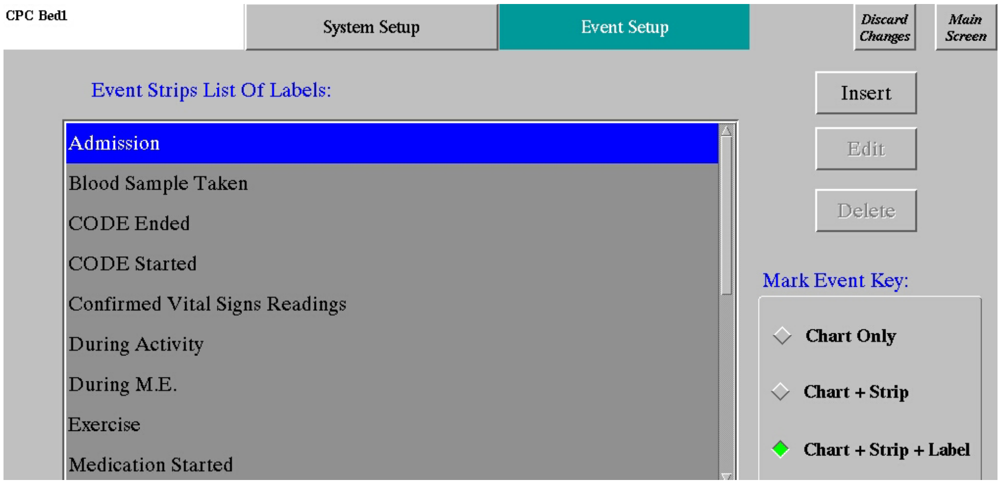

CPC Bed1
System Setup
Event Setup
Discard Changes
Main Screen
Event Strips List Of Labels:
Admission
Blood Sample Taken
CODE Ended
CODE Started
Confirmed Vital Signs Readings
During Activity
During M.E.
Exercise
Medication Started
Insert
Edit
Delete
Mark Event Key:
○ Chart Only
○ Chart + Strip
● Chart + Strip + Label

Figure 5-7 The Event Setup Panel

➢ *To Insert a new label:*

1. Select the Event Strip List in the Mark Event panel - it turns green
2. Select a Label
3. Select Insert - this opens the virtual keyboard on the Envoy screen
4. Prepare a label and press Accept

5. The new label is added above the selected label (item 2)

➢ ***To Delete a label:***

1. Select the Event Strip List in the Mark Event panel - it turns green
2. Select a Label
3. Select **Delete** – this deletes the label

➢ ***To Edit a label:***

1. Select the Event Strip List in the Mark Event panel - it turns green
2. Select a Label
3. Select Edit - this opens the virtual keyboard on the Envoy screen
4. Edit the label and press Accept
5. The new label will replace selected label

➢ ***To set the response to the Mark Event Key:***

Three response options are available:

- Chart only
- Chart + Strip
- Chart + Strip + Label

5.7.1.1 Chart

A row of vital signs at the time of Mark Event activation is added to the charts. The row is by a green dot.

5.7.1.2 Chart + Strip

In addition to the above, an Event Strip is stored in the monitor and is labeled as "Manual Event."

The Event strip starts 10 seconds before the time at which you press the Mark Event Key, and ends 10 seconds after the time at which you pressed the above key.

5.7.1.3 Chart + Strip + Label

In addition to the above, a list of labels is displayed on the monitor screen. The user can now select one of the labels for the event.

The event timing depends on the time of button activation and not on the **time of the labeling.**

NIBP Leakage test

Use the Leakage Test to test the leakage of the NIBP module including the patient cuff.

- To start the test, disconnect the cuff from the patient, rap the cuff around itself
- Press “Leakage Test” --- A password panel will open
- Enter the password – The test panel will open. The test panel contains a warning message : “Disconnect Patient from Cuff before Testing”
- Be sure that the cuff is not connected to a patient and press “Test”
- The module will inflate the cuff to a pressure of about 200 mmHg for adult cuff, or about 120 mmHg for neonatal cuff.
- After that all internal valves will be closed and the leakage will be tested for total time of 4 minutes
- The test results are displayed as : “Pressure after 1 minute” of inflation and “Pressure Difference” that is the pressure drop between the Initial pressure at 1 minute and the final pressure 3 minutes later.

Note : If you assume that the leakage is in internal parts of the module, start the test with a cuff connected, and at about 1 minute close the cuff tube near the pressure outlet using a surgical clamp.

5.8 Vital Sign (VS) Setup

The Vital Signs Setup menus enable you to set default parameters for each vital sign available for monitoring in the Envoy bedside monitor. These include alarm parameters and other parameters specific to the monitored vital sign.

The **Vital Signs Setup** menu enables you to access the following dialog panels:

- ECG Setup
- Respiration Setup
- BP Setup
- NIBP Setup
- SpO2 Setup
- Temperature Setup
- EtCO2 Setup
- CO Setup
- TcGas Setup
- CO2 Setup
- O2 Setup
- N2O Setup
- Agent Setup
- Ventilator Setup
- SvO2
- EEG Setup
- Spiro Setup

5.8.1 Accessing the Vital Signs Setup Dialog Panels

A dialog panel is provided for each available vital sign. You can access these dialog panels from the **Vital Sign Setup** menu.

➢ ***To access the Vital Sign Setup menu:***

1. In the **System Setup** menu, select **Vital Signs Setup**. The menu is displayed.
2. Select the vital sign for which you want to set defaults. The appropriate dialog panel is displayed.

5.8.2 ECG Setup

This dialog panel enables you to set ECG default parameters. These parameters include:

- **Alarm priorities for Heart Rate, Fault and Pacemaker alarms**

Alarm priority affects the order of audible and visual alarm notification. (See Alarm Priority section in the Chapter on Alarms) for a full description of this feature.

Heart Rate alarm priority can be set at a level of either C-1 or C-2. The factory setting is C-1.

- **Alarm Latching**

For a complete description of Alarm Latching, (see section in the Chapter on Alarms). The available options are **Off**, **Visual** (latching visual alarms only), and **On** (both visual and audible alarms). The factory default is **Off**.

- **Arrhythmia Package**

Enables you to determine the level of Arrhythmia analysis. The available levels are: **OFF**, **Basic** (includes Asystole, Vfib, V-tach, Run, PVC, and Pause) and **Extended** (includes Bradycardia, Supraventricular Tachycardia, SV Irregular Rhythm, Idioventricular Rhythm, Couplets of PVCs, Triplets of PVCs, Bigeminy, Trigeminy, R on T, PVC, Vfib, V-Tach, Multifocal PVCs, Interpolated PVCs, Asystole, Run, Pause, Premature Artrial Contraction, and Sinus Tachycardia).

- **Arrhythmia Priority**

Enables you to set default priority levels for all available Arrhythmia alarms. The available alarm priorities are as follows:

Arrhythmia Alarm Priorities

Arrhythmia	*C-1*	*C-2*	*C-3*	*Mennen Default Priority*
Asystole	X			C-1
Ventricular Fibrillation (VFIB)	X			C-1
Ventricular Tachycardia (VTACH)	X			C-1
Runs of PVC beats (RUN)	X	X		C-2
Bigeminy (BGM)	X	X	X	C-2
PVC beats per minute (PVC)	X	X	X	C-2
Pause Event (PAUSE)	X	X	X	C-3
Bradycardia (BRADY)	X			C-1

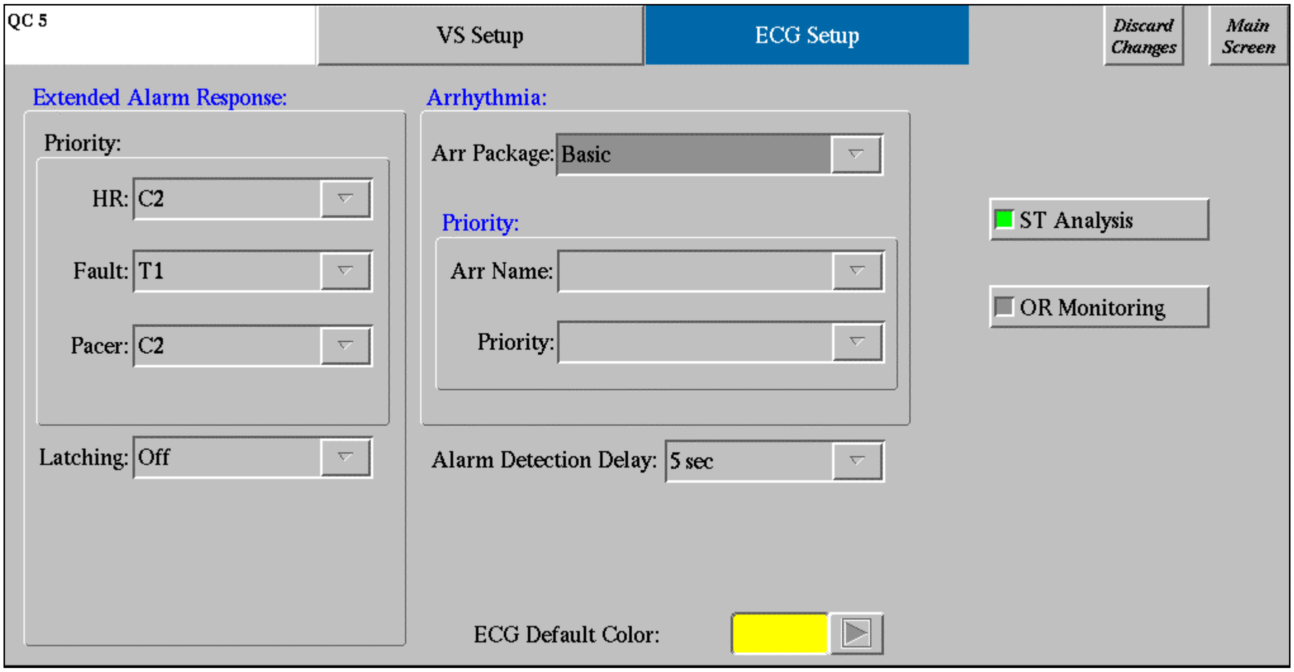
Tachycardia (TACHY)	X			C-1
Irregular Rhythm (IRREGULAR)	X	X	X	C-2
Idioventricular Rhythm (IDIOVENT)	X	X	X	C-2
Couplets of PVCs (COUPLET)	X	X	X	C-2
Triplets of PVCs (TRIPLET)	X	X	X	C-2
Trigeminy (TRIGEM)	X	X	X	C-2
R on T	X	X	X	C-2
Premature Atrial Contraction (PAC)	X	X	X	C-2
Atrial Fibrillation (AFIB)	X	X	X	C-2
Supraventricular Tachycardia (SVTACH)	X	X	X	C-2
Multi-focal PVCs (MULTIFOCAL)	X	X	X	C-2
Interpolated PVCs (INTPVC)	X	X	X	C-2

Alarm Detection Delay

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Default Color**

Defines the color in which ECG vital signs and waveforms appear on the main screen display. You have a choice of 16 colors. The factory default color is yellow.



Priority:

HR: C2

Fault: T1

Pacer: C2

Latching: Off

Arr Package: Basic

Priority:

Arr Name:

Priority:

Alarm Detection Delay: 5 sec

☑ ST Analysis

☐ OR Monitoring

ECG Default Color:

Figure 5-8 The ECG Setup Panel

➢ ***To define ECG default parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **ECG Setup**. The **ECG Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:
4. From the appropriate drop-down list, set the priority levels for **Heart Rate**, **Faults** and **Pacer**.
5. From the **Latching** drop-down list, set alarm latching to **On** or **Off**.
6. Under **Arrhythmia**, select the Arrhythmia Package that you want.

7. Under **Arr Priority**:
   - From the **Arr Name** drop-down list, select the type of arrhythmia for which you want to set alarm priority.
   - From the **Priority** drop-down list, select the priority level for the selected type of arrhythmia.
   - ST analysis: Toggle on (green) if you wish ST to be functional, or off to prevent activation of ST measurement.
   - OR monitoring: Toggle on (green) if you wish to enable Electrosurhgery filter (ESF) on the top displayed ECG lead,
8. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
9. Select **ECG Default Color**. A panel displaying all available colors appears.
   Select the required color. The panel closes.
10. Select **Discard Changes** to close the **ECG Setup** panel without applying any changes
    –or–
    Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue* **System Setup**, you must press the **System Setup** button again to access the **System Setup** menu.

5.8.3 Respiration Setup

This dialog panel enables you to set Respiration default parameters. These parameters include:

- **Alarm priorities for Resp Rate, Apnea and alarms**

Alarm priority affects the order of audible and visual alarm notification.
See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

Resp Rate, **Apnea**, and alarm priority can be set at a level of **C-1**, **C-2**, or **C-3**. The factory defaults are as follows:

Resp Rate: C-2

Apnea: C-2

- **Alarm Latching**

For a complete description of Alarm Latching, see (insert cross-reference to section in the chapter on Alarms). The available options are Off, Visual (latching visual alarms only), and **On** (both visual and audible alarms). The factory default is **Off**.

- **Alarm Detection Delay**

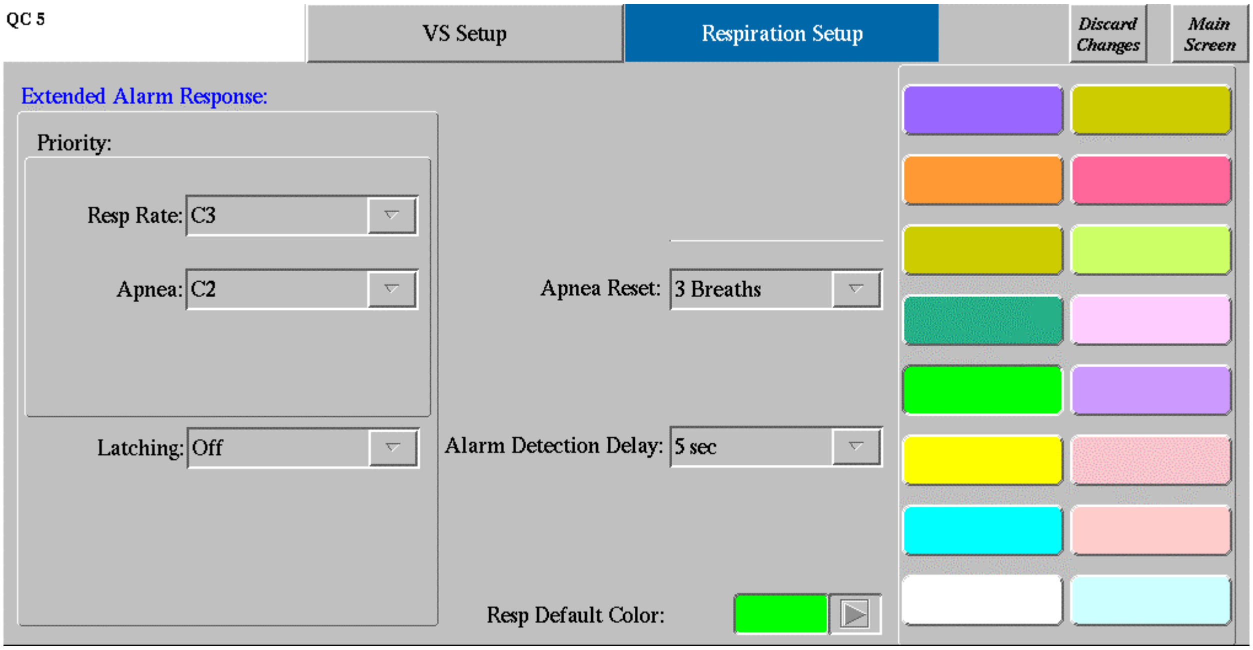
When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Apnea Reset**

Defines the default number of breaths the system uses to reset the apnea timer. The available options are; 2 breaths, 3 breaths, and 4 breaths.

- **Default Color**

Defines the color in which Respiration vital signs values and waveforms appear on the main screen display. You have a choice of 16 colors. The factory default color is green.



Resp Rate: C3

Apnea: C2

Latching: Off

Apnea Reset: 3 Breaths

Alarm Detection Delay: 5 sec

Resp Default Color: 🟩

Figure 5-9 The Respiration Setup Panel

➢ ***To define Respiration default parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.

2. From the **Vital Signs** menu, select **Respiration Setup**. The **Respiration Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:
4. From the appropriate drop-down list, set the default priority levels for **Resp Rate** and **Apnea**.
5. From the **Latching** drop-down list, set default alarm latching to **On** or **Off**.
6. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
7. From the **Apnea Reset** drop-down list, select the number of breaths required to reset the Apnea timer.
8. Select **Respiration Default Color**. A panel displaying all available colors appears. Select the required color. The panel closes.
9. Select **Discard Changes** to close the **Respiration Setup** panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue* **System Setup**, you must press the **System Setup** button again to access the **System Setup** menu.

5.8.4 BP Setup

This dialog panel enables you to set BP default parameters. These parameters include general default values applicable to all BPs and default values applicable to a specific BP site (such as ART, CVP, etc.)

5.8.4.1 General BP Default Parameters

- **Alarm priorities for BP, and Fault alarms**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

BP alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

Fault alarm priority can be set to T-1, or T-2. The factory default is T-1.

- **Alarm Latching**

For a complete description of Alarm Latching, see section in the Chapter on Alarms). The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Auto Scale**

Automatically sets the range of the BP waveform on the main screen display.

After Zero enables you to specify if autoscaling is done automatically after the BP is zeroed and in which cases. The available options are; **Always**, **Never**, and **Only After First Zero**. Under **Type**, you can define the type of autoscaling implemented. The available options are; **Normal**, and **Only Upper Limit** (meaning that the lower scale limits should be kept).

5.8.4.2 BP Site-Specific Default Parameters

- **Defaults per Site Name**

Defines the site for which the site-specific parameters are being set.

- **Units**

Determines the units used to measure the selected BP. The available options are; mmHg, Kpa, and cm H20. The factory default is mmHg.

- **Numeric Formats**

Determines the numeric format in which the selected BP is displayed.

When units are defined as mmHg, the available options are: SSS/DDD MMM, SSS/DDD mmm, and SSS/DDD. The factory default is SSS/DDD MMM.

When units are defined in Kpa, the available options are: SS.S/DD.D, and MM.M. The factory default is SS.S/DD.D **MM.M.**

- **Manual Scale**

Defines the default high and low scale limits for use when implementing manual scaling. The available options are as follows:

High Scale - 250, 300 and 350

Low Scale: -15, -10, and 0

- **BP Default Color**

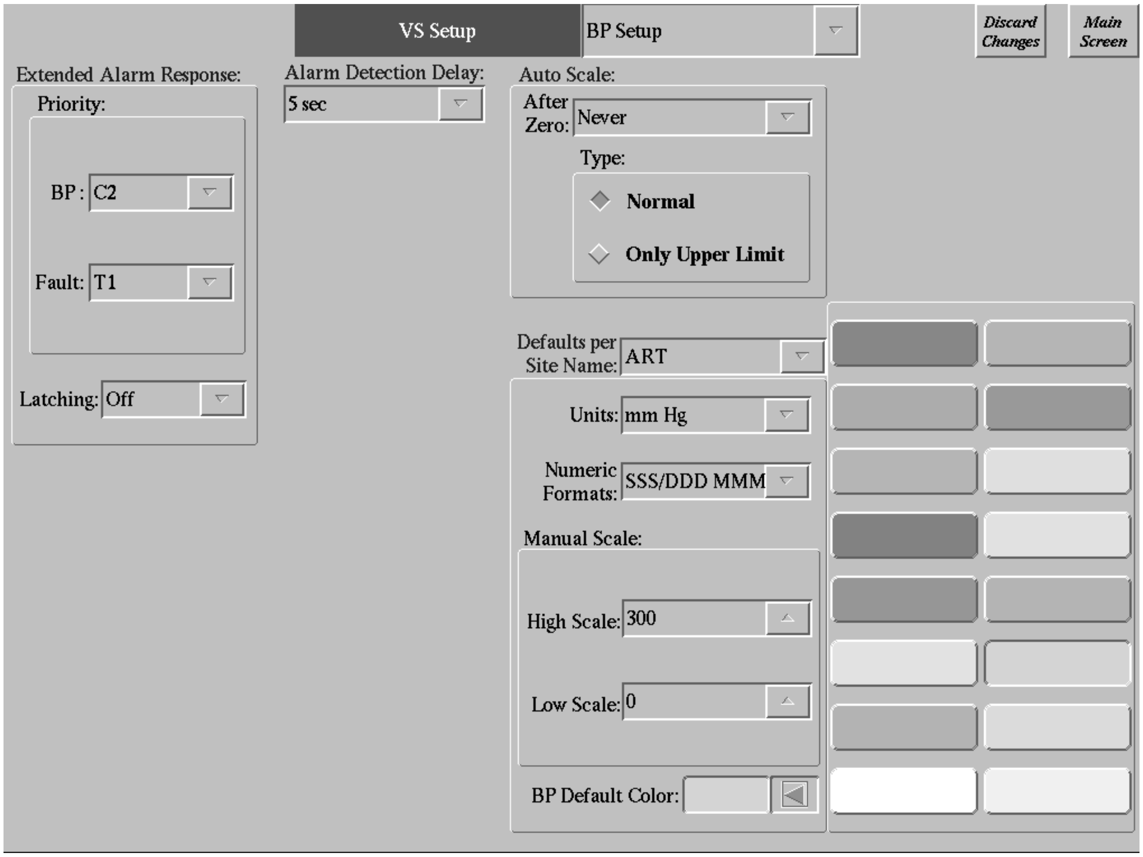
Defines the color in which BP vital signs values and waveforms appear on the main screen display. You have a choice of 16 colors. The factory default colors are as follows:

ART/UA - Pink

PAP - Light Blue

CVP - Orange

All others - Grey or Silver



Extended Alarm Response:
Priority:
BP: C2
Fault: T1
Latching: Off

Alarm Detection Delay: 5 sec

Auto Scale:
After Zero: Never
Type:
◆ Normal
◇ Only Upper Limit

Defaults per Site Name: ART
Units: mm Hg
Numeric Formats: SSS/DDD MMM
Manual Scale:
High Scale: 300
Low Scale: 0
BP Default Color:

Figure 5-10 The BP Setup Dialog Panel Displaying the Color Selection Panel

➢ ***To define default BP parameters***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **BP Setup**. The **BP Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

   From the appropriate drop-down list, set the default priority levels for **BP** and **Fault** alarms.

   From the **Latching** drop-down list, set default alarm latching to **On** or **Off**.

   From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
4. Under **Auto Scale**:

   From the After Zero drop-down list, select Always, Never, or Only After First Zero.

5. Under **Type**, select **Normal**, or **Only Upper Limit**.
6. From the **Defaults Per Site Name** drop-down list, select the BP for which you want to set site-specific default values.
7. From the **Units** drop-down list, select the type of units used to measure the selected BP.
8. From the **Numeric Formats** drop-down list, select the required format in which to display the BP reading.
9. Under **Manual Scale**; from the **High**/**Low Scale** drop-down lists, select the required upper/lower limits for manual scaling.
10. Select **BP Default Color**. A panel displaying all available colors appears. Select the required color. The panel closes.
11. Select **Discard Changes** to close the **BP Setup** panel without applying any changes
    –or–
    Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue* **System Setup**, you must press the **System Setup** button again to access the **System Setup** menu.

5.8.5 NIBP Setup

This dialog panel enables you to set NIBP default parameters. These parameters include setting alarm priority for both **NIBP** and **Pulse Rate** alarms, defining the default cuff type for the monitor, setting reading intervals and specifying the measurement units used to display NIBP values.

o **Alarm priorities for NIBP**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

NIBP alarm priority can be set to C-1, C-2, or C-3. The factory default is C-1.

o **Alarm Latching**

For a complete description of Alarm Latching, refer to Chapter 7, “Alarms” in the *Envoy Operation Manual*. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

o **Cuff Type**

Defines the default cuff type to be used by the Envoy. The available cuff types are Adult or Neonatal. The factory default is Adult.

- **Reading Intervals**

  Use to set defaults for T and Q intervals. Refer to Chapter 11, “NIBP Monitoring” in the *Envoy Operation Manual* for a complete description of this concept.

- **Units**

  Determines the units used to measure NIBP. The available options are; mmHg, Kpa, and cm H_20. The factory default is mmHg.

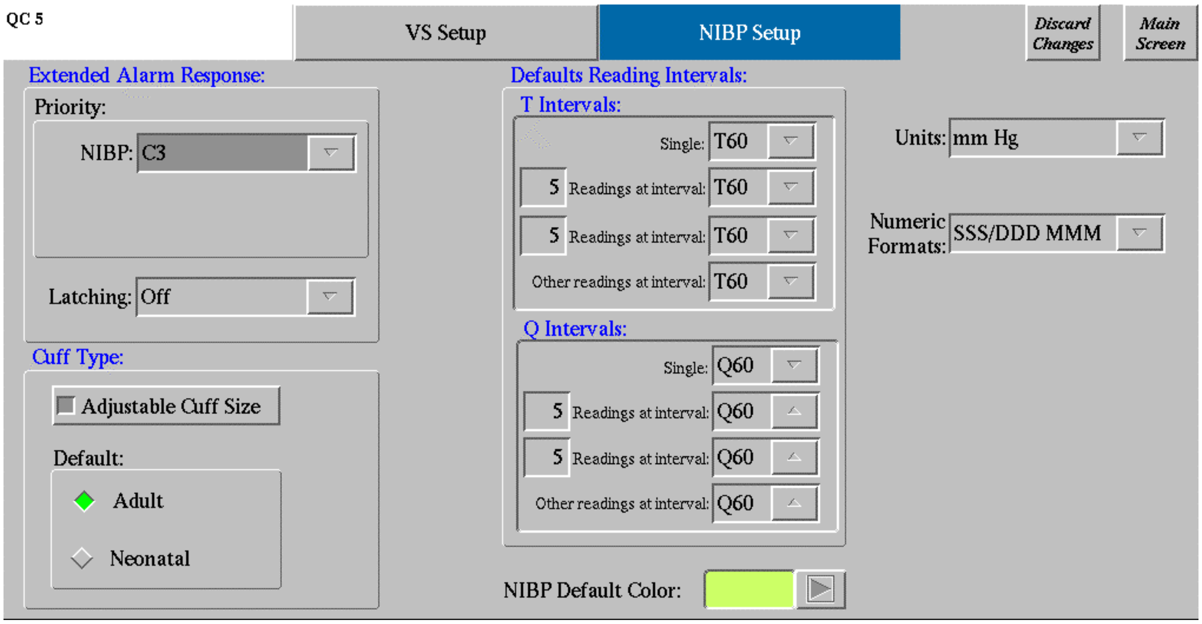
- **Numeric Formats**

  Determines the numeric format in which the NIBP reading is displayed.

  - When units are defined as mmHg, the available options are; SSS/DDD MMM, SSS/DDD mmm, and SSS/DDD. The factory default is SSS/DDD MMM.
  - When units are defined in Kpa, the available options are: SS.S/DD.D, and MM.M. The factory default is SS.S/DD.D

- **NIBP Default Color**

  Defines the color in which NIBP values appear on the main screen display. You can choose from 16 available colors.



Extended Alarm Response:

Priority:

NIBP: C3

Latching: Off

Cuff Type:

☐ Adjustable Cuff Size

Default:

● Adult

○ Neonatal

Defaults Reading Intervals:

T Intervals:

Single: T60

5 Readings at interval: T60

5 Readings at interval: T60

Other readings at interval: T60

Q Intervals:

Single: Q60

5 Readings at interval: Q60

5 Readings at interval: Q60

Other readings at interval: Q60

Units: mm Hg

Numeric Formats: SSS/DDD MMM

NIBP Default Color: 🟩

Figure 5-11 The NIBP Setup Dialog Panel

➢ ***To set NIBP default parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.

2. From the **Vital Signs** menu, select **BP Setup**. The **BP Setup** dialog panel is displayed.
3. Under Extended Alarm Response:

   From the appropriate drop-down list, set the default priority levels for **NIBP** and **Pulse Rate** alarms.

   From the **Latching** drop-down list, set default alarm latching to **On** or **Off**.
4. Under **Cuff Type**:
   - Select the **Adjustable Cuff Size** checkbox to enable user access to the **Cuff Type** panel. Clear the checkbox **Adjustable Cuff Type** to remove the **Cuff Type** menu item from the NIBP menu.
   - Select the default cuff type, **Adult** or **Neonatal**.
5. Under **Default Reading Intervals**, set the required parameters for T and Q intervals.
6. From the **Units** drop-down list, select the type of units used to measure NIBP.
7. From the **Numeric Formats** drop-down list, select the required format in which to display the NIBP reading.
8. Select **NIBP Default Color**. A panel displaying all available colors appears. Select the required color.
9. Select **Discard Changes** to close the panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.6 SpO2 Setup

This dialog panel enables you to set SpO2 default parameters. These parameters include setting alarm priority for SpO2, Pulse Rate and Fault alarms, activating or deactivating alarm latching, defining Alarm Detection delay and disabling SpO2 alarms during NIBP readings.

- **Alarm priorities for SpO2, Pulse Rate, and Fault alarms**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

SpO2 and Pulse Rate alarm priority can be set to C-1, C-2, or C-3. The factory default for both parameters is C-1.

Fault alarm priority can be set to T-1 or T-2. The factory default is T-1.

- **Alarm Latching**

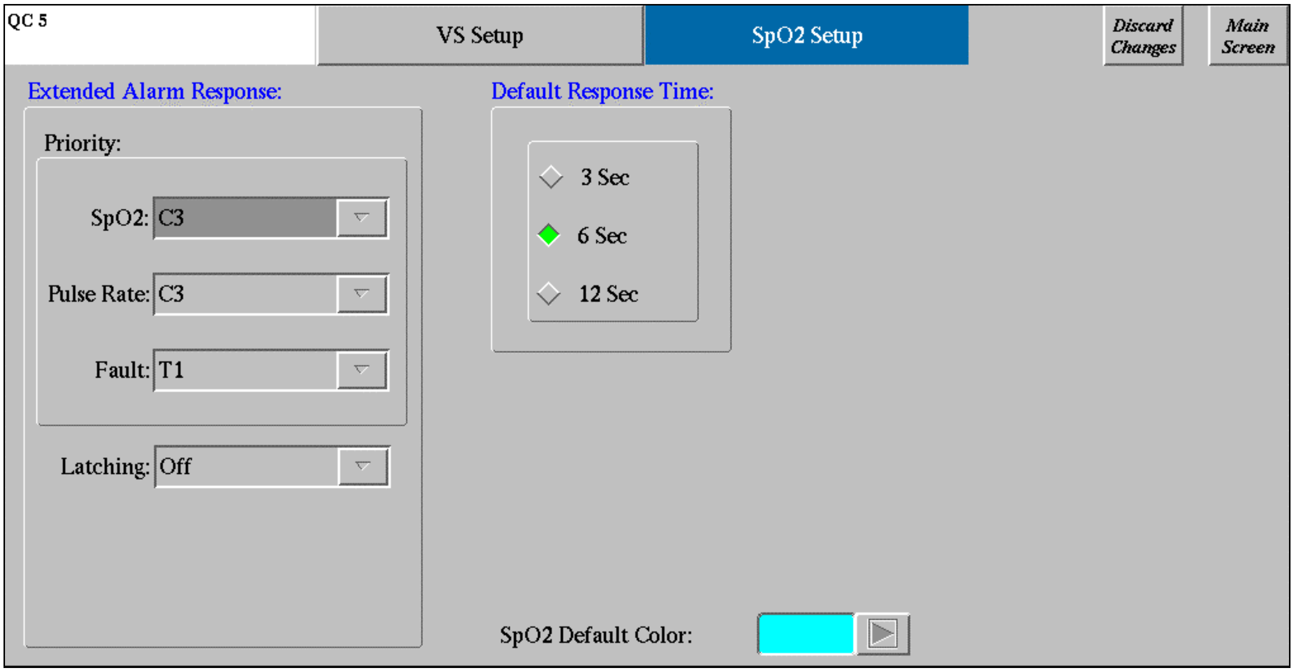
For a complete description of Alarm Latching, refer to Chapter 7, “Alarms” in the “Envoy Operation Manual”. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Response Time**

When an alarm is detected, a pre-defined response time allows the system to check in order to avoid false alarms. The delay can be set to 3, 6, or 12 seconds. The factory default is set to 6 seconds.

- **SpO2 Default Color**

Defines the color in which SpO2 values appear on the main screen display. You can choose from 16 available colors.



Extended Alarm Response:

Priority:

SpO2: C3

Pulse Rate: C3

Fault: T1

Latching: Off

Default Response Time:

◇ 3 Sec

◆ 6 Sec

◇ 12 Sec

SpO2 Default Color:

Figure 5-12 The SpO2 Setup Dialog Panel

➢ ***To set SpO2 default parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **BP Setup**. The **BP Setup** dialog panel is displayed.

3. Under **Extended Alarm Response**:

   From the appropriate drop-down list, set the default priority levels for **SpO2**, **Pulse Rate**, and **Fault** alarms.

   From the **Latching** drop-down list, set default alarm latching to **On** or **Off**.

4. Select the **Disable SpO2 Alarms During NIBP** checkbox to stop detection of SpO2 alarms (if monitored) while taking an NIBP reading. Clear the checkbox to reactivate SpO2 alarms.
5. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
6. Select **SpO2 Default Color**. A panel displaying all available colors appears. Select the required color.
7. Select **Discard Changes** to close the panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.7 Temperature Setup

This dialog panel enables you to set Temperature default parameters. These parameters include setting Temperature alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default color for Temperature values.

- **Temperature Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

Temperature alarm priority can be set to C-1, C-2, C-3 or C-4. The factory default is C-4.

- **Alarm Latching**

For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

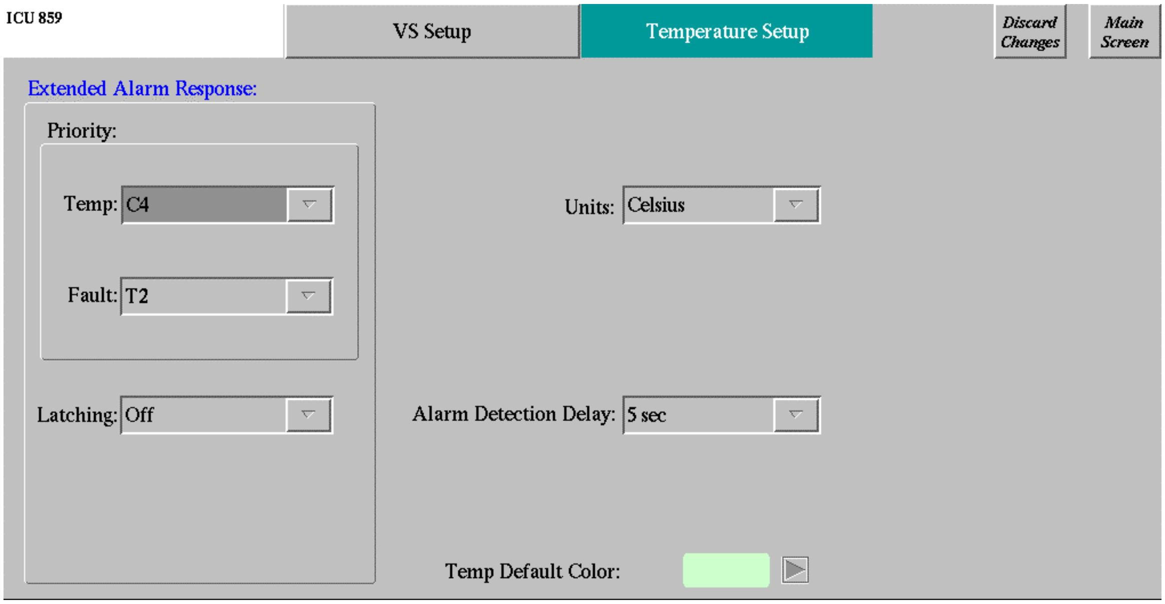
When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Units**

  Defines the default units used to measure and display temperature. The available options are Celsius or Fahrenheit. The factory default is Celsius.

- **Temperature Default Color**

  Defines the color in which Temperature values appear on the main screen display. You can choose from 16 available colors.



Temp: C4

Fault: T2

Latching: Off

Units: Celsius

Alarm Detection Delay: 5 sec

Temp Default Color: 🟩

Figure 5-13 The Temperature Dialog Panel

➢ ***To set default Temperature parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **Temperature Setup**. The **Temperature Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

   From the **Temp** drop-down list, set the default priority level for temperature alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.

   From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).

   From the **Units** drop-down list, select the required default measurement unit (Celsius or Fahrenheit).

4. Select **Temperature Default Color**. A panel displaying all available colors appears. Select the required color.
5. Select **Discard Changes** to close the panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.8 EtCO2 Setup

This dialog panel enables you to set EtCO2 default parameters. These parameters include setting EtCO2 alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for etCO2 values.

- **EtCO2 Alarm Priority**

  Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

  EtCO2 alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

  For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the *Envoy Operation Manual*. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

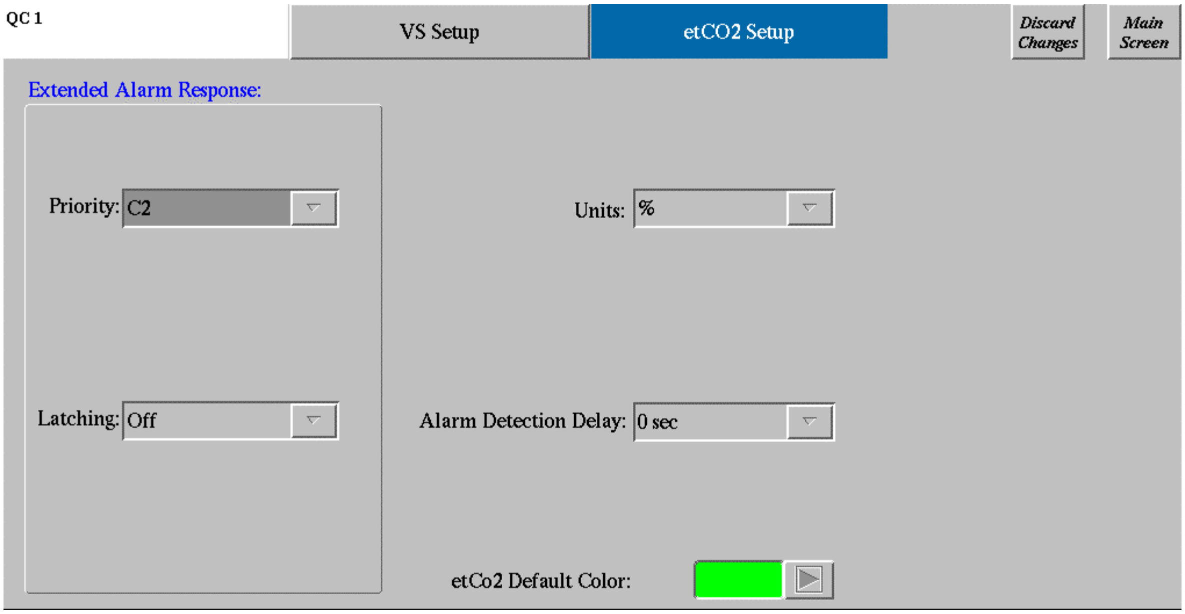
  When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 0 seconds.

- **Units**

  Defines the default units used to measure and display EtCO2. The available options are % or mmHg. The factory default is %.

- **EtCO2 Default Color**

  Defines the color in which EtCO2 values appear on the main screen display. You can choose from 16 available colors.



Priority: C2

Units: %

Latching: Off

Alarm Detection Delay: 0 sec

etCo2 Default Color: 🟩

Figure 5-14 The EtCO2 Dialog Panel

➢ ***To set default EtCO2 parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **EtCO2 Setup**. The **EtCO2 Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

Set the default priority level for EtCO2 alarms.

From the **Latching** drop-down list, set default alarm latching to On or Off.

From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).

From the **Units** drop-down list, select the required default measurement unit (% or mmHg).

4. Select **EtCO2 Temperature Default Color**. A panel displaying all available colors appears. Select the required color.
5. Select Discard Changes to close the panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

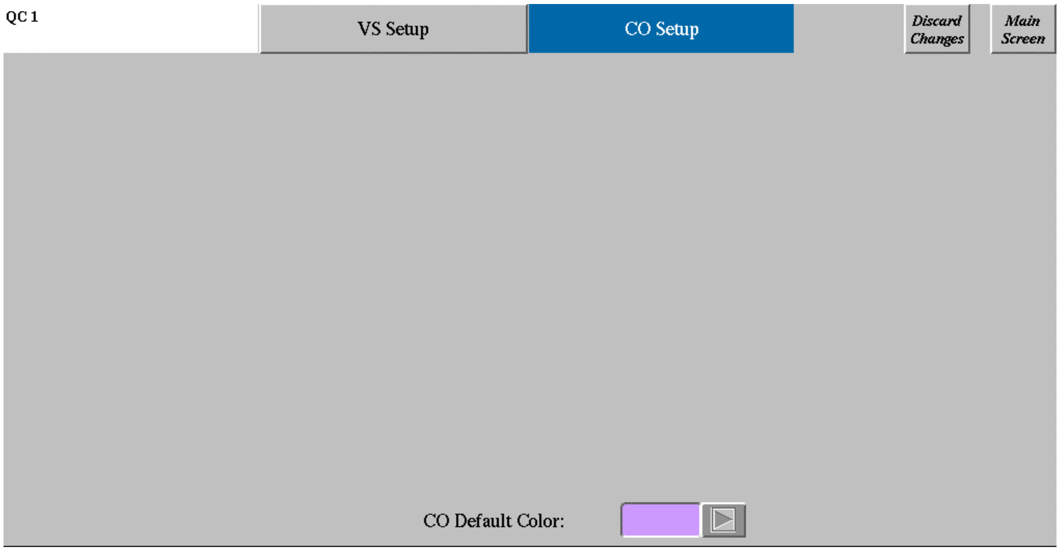
Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.9 Cardiac Output (CO) Setup

This dialog panel enables you to set the CO default color.

CO Default Color

Defines the color in which CO values appear on the main screen display. You can choose from 16 available colors.



CO Default Color:

Figure 5-15 The CO Dialog Panel

➢ ***To set default CO parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **CO Setup**. The CO **Setup** dialog panel is displayed.
3. Select **CO Default Color**. A panel displaying all available colors appears. Select the required color.
4. Select Discard Changes to close panel without applying any changes
   -or-
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.10 Transcoutaneous Gas (TcGas) Setup

This dialog panel enables you to set TcGas default parameters. These parameters include setting TcGas alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for TcGas values.

- **TcGas Alarm Priority**

  Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

  TcGas alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2. TcGas technical fault priority can be set as T1 or T2. The factory default is T2. The Sensor Temperature alarm priority is set T2.

- **Alarm Latching**

  For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the *Envoy Operation Manual*. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

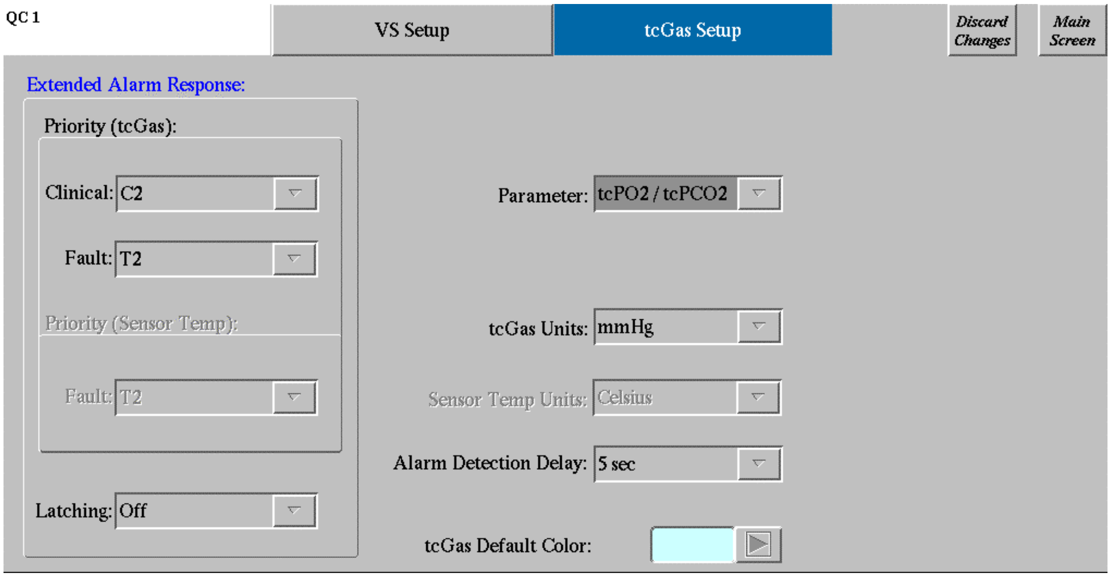
  When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Units**

  Defines the default units used to measure and display temperature. The available options are mmHg or kPa for Tc PO2/ Tc Co2. The factory default is mmHg. The sensor temperature unit options are Celsius or Fahrenheit. The factory default is Celsius.

- **TcGas Default Color**

  Defines the color in which TcGas values appear on the main screen display. You can choose from 16 available colors.



Extended Alarm Response:

Priority (tcGas):

Clinical: C2

Fault: T2

Priority (Sensor Temp):

Fault: T2

Latching: Off

Parameter: tcPO2 / tcPCO2

tcGas Units: mmHg

Sensor Temp Units: Celsius

Alarm Detection Delay: 5 sec

tcGas Default Color:

Figure 5-16 The TcGas Dialog Panel

➢ ***To set TcGas parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **TcGas Setup**. The **TcGas Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

   Set the default priority level for **TcGas** alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.
4. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
5. From the **TcGas** drop-down list, select the required default measurement unit (mmHg or kPa). Select the required default measurement unit (Celsius or Fahrenheit) from the Sensor Temperature units drop down list
6. Select **TcGas Default Color**. A panel displaying all available colors appears. Select the required color.
7. Select **Discard Changes** to close the panel without applying any changes

   –or–

   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.11 CO2 (from Anesthetic Gas) Setup

This dialog panel enables you to set CO2 default parameters. These parameters include setting CO2 alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for CO2 values.

- **CO2 Alarm Priority**

  Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

  CO2 alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

  For a complete description of Alarm Latching, refer to Chapter 7, "Alarms", in the *Envoy Operation Manual*. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

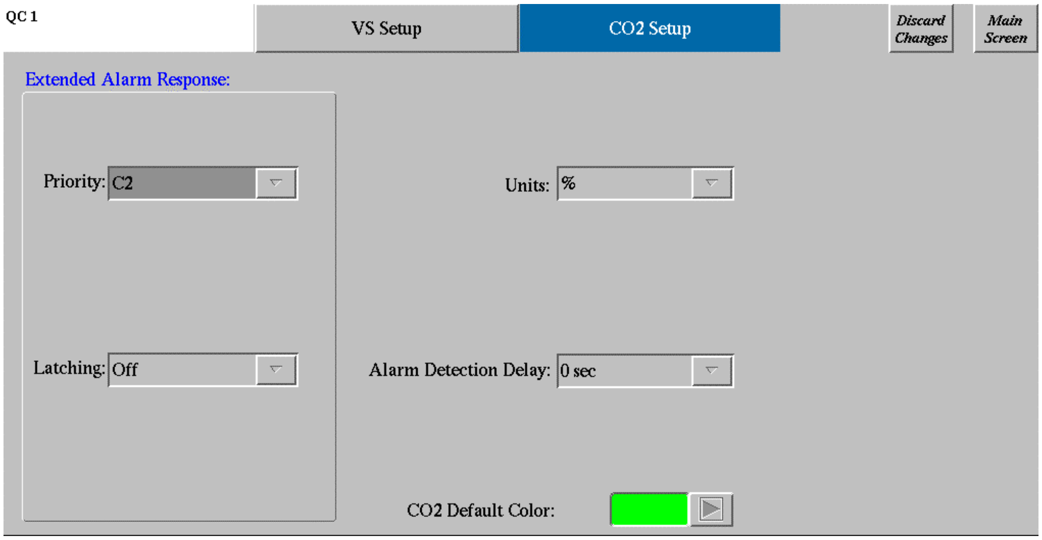
  When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 0 seconds.

- **Units**

  Defines the default units used to measure and display CO2. The available options are % or mmHg. The factory default is mmHg.

- **CO2 Default Color**

  Defines the color in which CO2 values appear on the main screen display. You can choose from 16 available colors.



Priority: C2

Latching: Off

Units: %

Alarm Detection Delay: 0 sec

CO2 Default Color: 🟩

Figure 5-17 The CO2 Dialog Panel

➢ ***To set default CO2 parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **CO2 Setup**. The **CO2 Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

   Set the default priority level for Co2 alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.
4. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
5. From the **Units** drop-down list, select the required default measurement unit (% or mmHg).
6. Select **CO2 Default Color**. A panel displaying all available colors appears. Select the required color.
7. Select **Discard Changes** to close the panel without applying any changes

   –or–

   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.12 O2 Setup

This dialog panel enables you to set O2 default parameters. These parameters include setting O2 alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for O2 values.

- **O2 Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

O2 alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

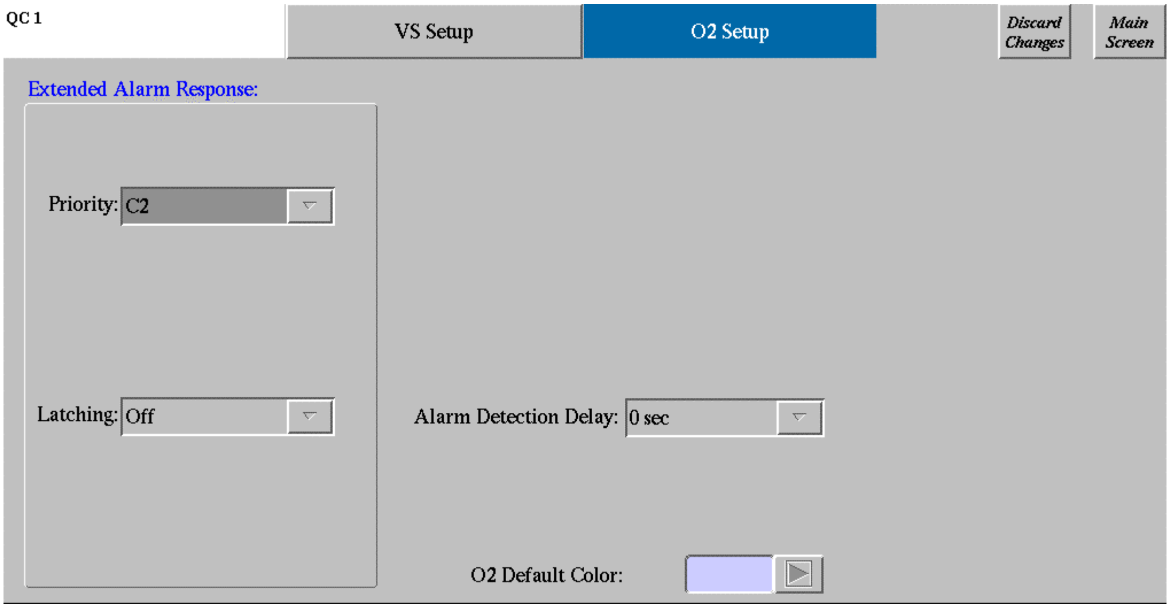
For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 0 seconds.

- **O2 Default Color**

Defines the color in which O2 values appear on the main screen display. You can choose from 16 available colors.



Priority: C2

Latching: Off

Alarm Detection Delay: 0 sec

O2 Default Color:

Figure 5-18 The O2 Dialog Panel

➢ ***To set default O2 parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**.
The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **O2 Setup**.
The **O2 Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

   Set the default priority level for O2 alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.
4. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
5. Select **O2 Default Color**. A panel displaying all available colors appears. Select the required color.
6. Select **Discard Changes** to close the panel without applying any changes
–or–
Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.13 N2O Setup

This dialog panel enables you to set N2O default parameters. These parameters include setting N2O alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for N2O values.

- **N2O Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

N2O alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

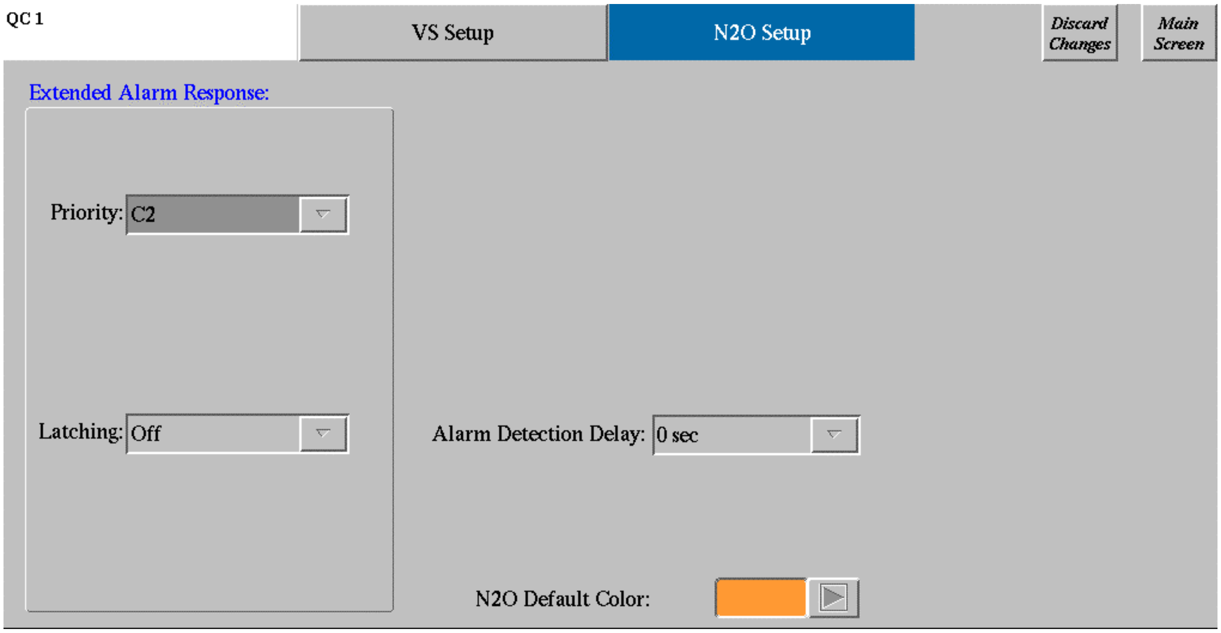
For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 0 seconds.

- **N2O Default Color**

Defines the color in which N2O values appear on the main screen display. You can choose from 16 available colors.



Priority: C2

Latching: Off

Alarm Detection Delay: 0 sec

N2O Default Color:

Figure 5-19 The N2O Dialog Panel

➢ ***To set default N2O parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.

2. From the **Vital Signs** menu, select **N2O Setup**. The **N2O Setup** dialog panel is displayed.

3. Under **Extended Alarm Response**:

   Set the default priority level for **N2O** alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.

4. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).

5. Select **N2O Default Color**. A panel displaying all available

colors appears. Select the required color.

6. Select **Discard Changes** to close the panel without applying any changes
–or–
Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.14 Anesthetic Agent Setup

This dialog panel enables you to set Anesthetic Agent default parameters. These parameters include setting Anesthetic Agent alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for Anesthetic Agent values.

- **Anesthetic Agent Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

Anesthetic Agent alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

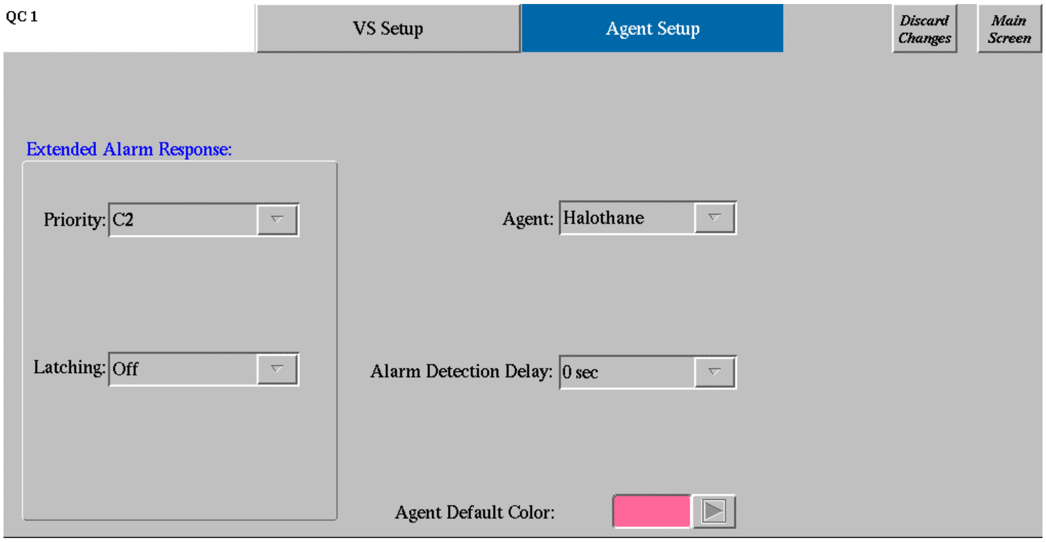
For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 10 seconds.

- **Anesthetic Agent Default Color**

Defines the color in which Anesthetic Agent values appear on the main screen display. You can choose from 16 available colors.



Priority: C2

Latching: Off

Agent: Halothane

Alarm Detection Delay: 0 sec

Figure 5-20 The Anesthetic Agent Dialog Panel

➢ ***To set default Anesthetic Agent parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.

2. From the **Vital Signs** menu, select Anesthetic Agent **Setup**. The Anesthetic Agent **Setup** dialog panel is displayed.
3. Under Extended Alarm Response:
   Set the default priority level for Anesthetic Agent alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.

4. From the Anesthetic Agent drop down list, select either one of the 5 Anesthetic Agents or select Automatic for automatic selection of the Agent.

5. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).

6. Select **Agent Default Color**. A panel displaying all available colors appears. Select the required color.

7. Select **Discard Changes** to close the panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.15 Ventilator Setup

This dialog panel enables you to set Ventilator default parameters. These parameters include setting Ventilator alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for Ventilator values.

- **Ventilator Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

Ventilator alarm priority can be set to C-1, C-2, or C-3.
The factory default is C-2.

- **Alarm Latching**

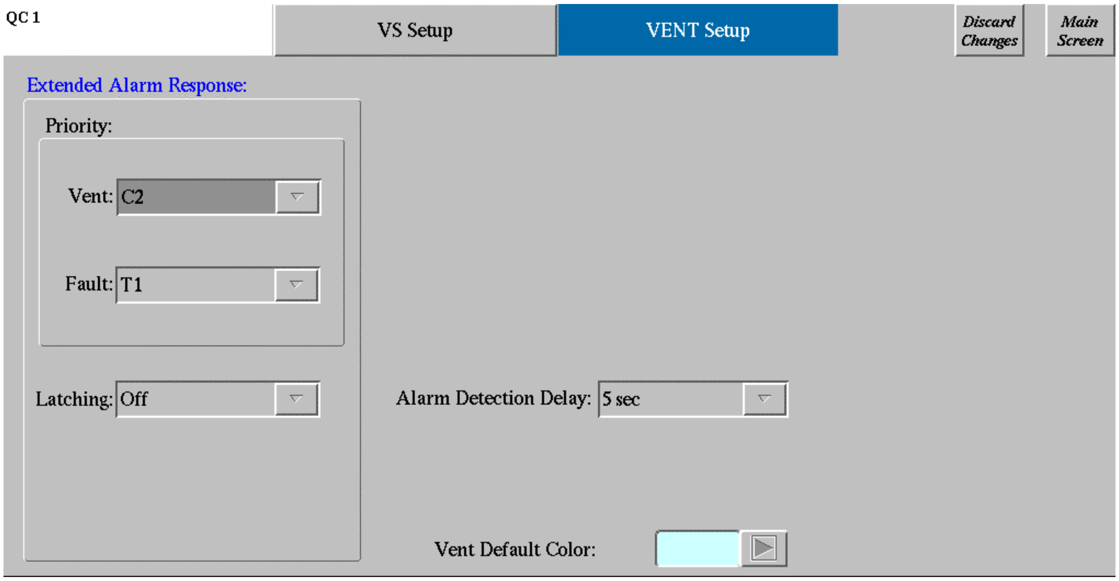
For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Ventilator Default Color**

Defines the color in which Anesthetic Agent values appear on the main screen display. You can choose from 16 available colors.



Extended Alarm Response:

Priority:

Vent: C2

Fault: T1

Latching: Off

Alarm Detection Delay: 5 sec

Vent Default Color:

Figure 5-21 The Ventilator Dialog Panel

➢ ***To set default Ventilator parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select Ventilator **Setup**. The Ventilator **Setup** dialog panel is displayed.
3. Under **Extended Alarm Response**:

   Set the default priority level for Ventilator alarms.

   From the **Latching** drop-down list, set default alarm latching to On or Off.

4. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).
5. Select **Ventilator Default Color**. A panel displaying all available colors appears. Select the required color.
6. Select **Discard Changes** to close the panel without applying any changes
   –or–
   Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.16 SvO2 Setup

This dialog panel enables you to set SvO2 default parameters. These parameters include setting SvO2 alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for SvO2 values.

- **Sv2O Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

SvO2 alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

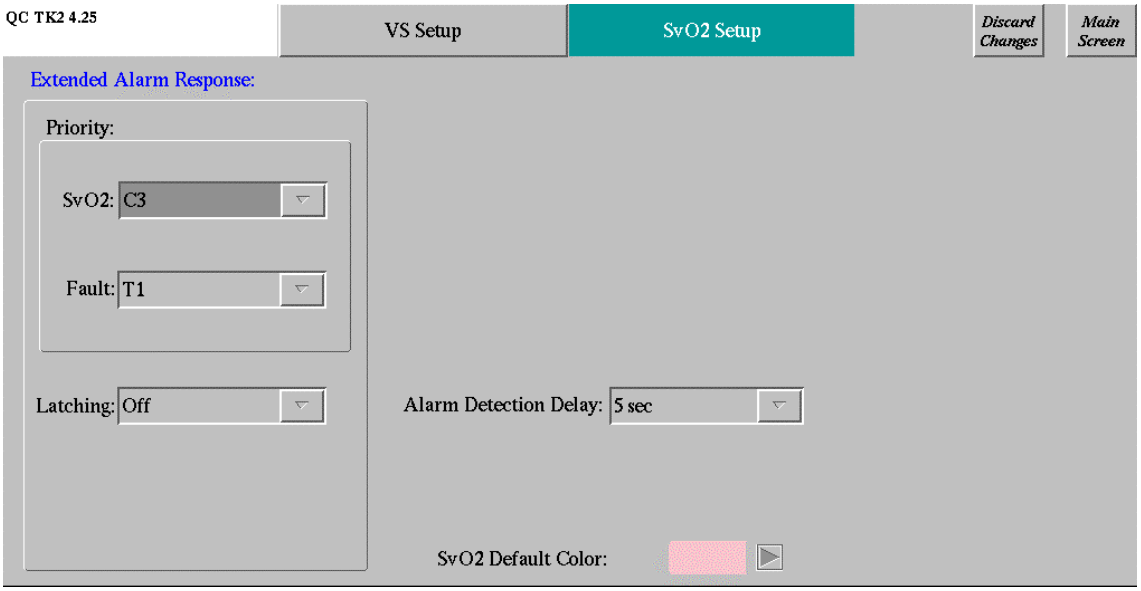
For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

  When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **SvO2 Default Color**

  Defines the color in which SvO2 values appear on the main screen display. You can choose from 16 available colors.



Extended Alarm Response:

Priority:

SvO2: C3

Fault: T1

Latching: Off

Alarm Detection Delay: 5 sec

SvO2 Default Color:

Figure 5-22 The Svo2 Dialog Panel

➢ ***To set default SvO2 parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.

2. From the **Vital Signs** menu, select **SvO2 Setup**. The **N2O Setup** dialog panel is displayed.

3. Under **Extended Alarm Response**:

   Set the default priority level for **SvO2** alarms.

4. From the **Latching** drop-down list, set default alarm latching to On or Off.

5. From the **Alarm Detection Delay** drop-down list, select the required delay time (in seconds).

6. Select **SvO2 Default Color**. A panel displaying all available colors appears. Select the required color.

7. Select **Discard Changes** to close the panel without applying any changes
–or–
Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.17 EEG Setup

This dialog panel enables you to set EEG default parameters. These parameters include EEG technical alarm priority and selecting the default color for EEG waveforms.

- **EEG Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

EEG Technical alarm priority can be set to T-1, T-2. The factory default is T-2.

- **EEG Default Color**

Defines the color in which EEG waveforms appear on the main screen display. You can choose from 16 available colors.

➢ ***To set default EEG parameters:***

1. From the **System Setup** menu, select **Vital Signs Setup**. The **Vital Signs** menu is displayed.
2. From the **Vital Signs** menu, select **EEG Setup**. The **EEG Setup** dialog panel is displayed.
3. Select **EEG Default Color**. A panel displaying all available colors appears. Select the required color.
4. Select **Discard Changes** to close the panel without applying any changes
–or–
Select **Main Screen** to apply the changes and exit the panel.

Note: *When you exit a vital signs setup panel, you return to the main screen. To continue System Setup, you must press the* **System Setup** button again to access the **System Setup** menu.

5.8.18 Spirometry Setup

This dialog panel enables you to set Spirometry default parameters. These parameters include setting Spirometry alarm priority activating or deactivating alarm latching, defining Alarm Detection delay and selecting the default units and color for Spirometry values.

- **Spirometry Alarm Priority**

Alarm priority affects the order of audible and visual alarm notification. See (insert cross-reference to Alarm Priority section in the chapter on alarms) for a full description of this feature.

Spirometry alarm priority can be set to C-1, C-2, or C-3. The factory default is C-2.

- **Alarm Latching**

For a complete description of Alarm Latching, refer to Chapter 7, “Alarms”, in the Envoy Operation Manual. The available options are Off, Visual (latching visual alarms only), and On (both visual and audible alarms). The factory default is Off.

- **Alarm Detection Delay**

When an alarm is detected, a pre-defined delay period allows the system to check in order to avoid false alarms. The delay can be set to 0, 3, 5, or 10 seconds. The factory default is set to 5 seconds.

- **Spirometry Default Color**

Defines the color in which Spirometry values appear on the main screen display. You can choose from 16 available colors.

5.8.19 Vital Signs Priority

The available and default alarm priorities appear in the table below:

Vital Sign	C-1	C-2	C-3	C-4	T-1	T-2	Default
Heart Rate	X	X					C-1
Resp Rate	X	X	X				C-2
Apnea,	X	X	X				C-2
BP	X	X	X				C-2
BP Fault					X	X	T-1
NIBP	X	X	X				C-1
SpO2	X	X	X				C-1
SpO2 Pulse Rate	X	X	X				C-1
SpO2 Fault					X	X	T-1

Temperature	X	X	X	X			C-4
eTCO2	X	X	X				C-2
TcGas	X	X	X				C-2
TcGas					X	X	T-2
TcGas temperature					X	X	T-2
CO2	X	X	X				C-2
O2	X	X	X				C-2
N2O	X	X	X				C-2
Anesthesia Agent	X	X	X				C-2
Ventilator	X	X	X				C-2

5.9 Parameter Hierarchy

Note: This dialog panel is active only when a patient is being monitored.

The Parameter Hierarchy panel enables you to set the waveform and “big number” display on the monitor screen, from top for high hierarchy to bottom for lower hierarchy.

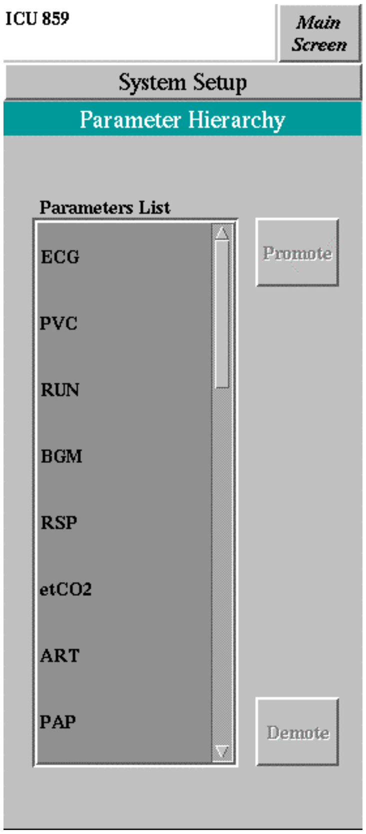

ICU 859
Main Screen
System Setup
Parameter Hierarchy
Parameters List
ECG
PVC
RUN
BGM
RSP
etCO2
ART
PAP
Promote
Demote

Figure 5-23 The Parameter Hierarchy Setup Panel

➢ *To set the Parameter Hierarchy panel*

1. From the System Setup menu, select Parameter Hierarchy.
   The Parameters list menu is displayed.
2. **From the** Parameters list **menu, select a parameter.**
3. To promote a parameter, select **Promote**
4. To demote a parameter, select **Demote**
5. When the required hierarchy is obtained, select **main screen**

The display will then be reorganized according to the new hierarchy.

5.10 Monitor Profiles Setup

When admitting a patient, the admitting staff member must define which vital signs to monitor and how those parameters appear on the main screen display. In order to simplify this process, the monitor can be configured with pre-defined monitor profiles which include all definitions necessary for admitting various types of patients, such as adult, pediatric, geriatric, etc. Monitor profiles make it possible to prepare standard patient monitoring profiles allowing staff to connect a patient quickly without having to first configure the Envoy (or at least to reduce configuration to a minimum).

Up to 12 Monitor profiles can be configured for use in the Envoy. This includes 11 user-defined monitor profiles and one default “Admit as previous” key that saves the settings defined for the previous patient monitored by the unit. Only those Monitor profiles defined for use in the unit appear on the display screen.

You can set up Monitor profiles while monitoring an actual patient, or you can start the Envoy without actually connecting a patient, set up monitoring parameters and then save them as a Monitor profile.

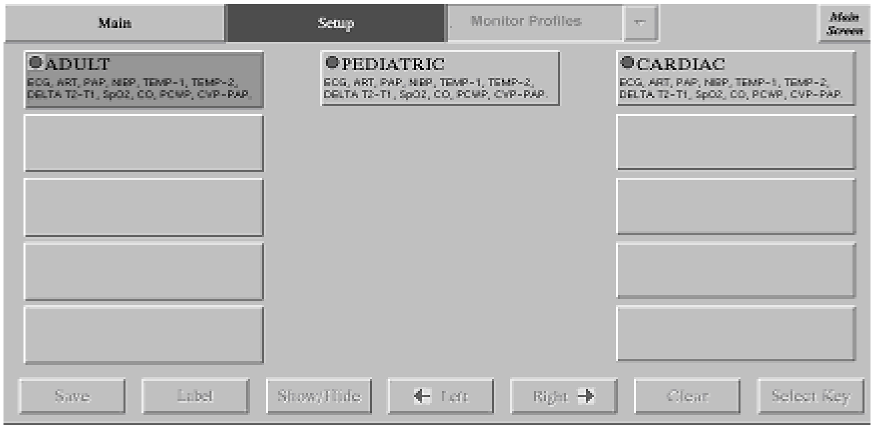

Main
Setup
Monitor Profiles
Main Screen
ADULT
ECG, ART, PAP, NIBP, TEMP-1, TEMP-2, DELTA T2-T1, SpO2, CO, PCWP, CVP-PAP.
PEDIATRIC
ECG, ART, PAP, NIBP, TEMP-1, TEMP-2, DELTA T2-T1, SpO2, CO, PCWP, CVP-PAP.
CARDIAC
ECG, ART, PAP, NIBP, TEMP-1, TEMP-2, DELTA T2-T1, SpO2, CO, PCWP, CVP-PAP.
Save
Label
Show/Hide
Left
Right
Clear
Select Key

Figure 5-24 The Monitor Profiles Setup Dialog Panel

Monitor profiles are defined in the Monitor profiles panel which can be accessed from the Setup menu. The keys are displayed on the panel in the order in which they appear on the Envoy screen when admitting a patient. Any defined Monitor profiles are labelled with their defined name and monitoring parameters.

➢ ***To set up a new Monitor profile:***

1. Set up the monitoring parameters you want according to the instructions in the Vital Signs Monitoring section.
2. Press the **Setup** key on the front panel and select Monitor profiles from the Setup menu. The Monitor profile panel is displayed.

3. Press **Select Key**.
4. Select an available key. A frame appears around the key and the buttons along

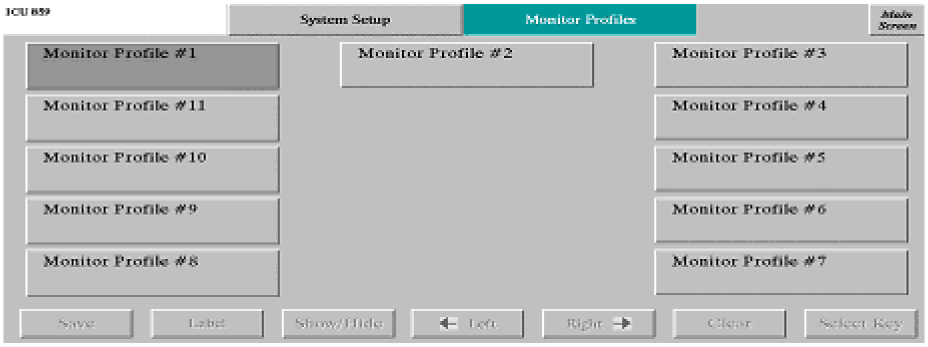

ICU 859
System Setup
Monitor Profiles
Main Screen
Monitor Profile #1
Monitor Profile #2
Monitor Profile #3
Monitor Profile #11
Monitor Profile #4
Monitor Profile #10
Monitor Profile #5
Monitor Profile #9
Monitor Profile #6
Monitor Profile #8
Monitor Profile #7
Save
Label
Show/Hide
Left
Right
Clear
Select Key

Figure 5-25 The Monitor Profiles Selection Setup

➢ ***To set up a new Monitor profile:***

1. Set up the monitoring parameters you want according to the instructions in the Vital Signs Monitoring section.
2. Press the **Setup** key on the front panel and select Monitor profiles from the **Setup** menu. The Monitor profile panel is displayed.
3. Press **Select Key.**
4. Select an available key. A frame appears around the key and the buttons along the bottom of the panel become available.
5. Click **Save**.

➢ ***To name a new Monitor profile:***

1. Press **Select** Key in the **Monitor profiles** panel
2. Turn the QuicKnob and press an available key
3. Press **Label**. The alphanumeric keyboard panel appears.
4. Enter the text for the label and press **Accept.**

5.10.1 Showing/Hiding the Monitor profile on the Main Screen

Once you have defined a Monitor profile, you can also determine whether it is available for use when admitting a new patient. A green bullet appears next to those Monitor profiles that are set to appear on the main screen.

➢ ***To show or hide the Monitor profile:***

1. **In the** Monitor profiles **panel, press** Select Key.
2. Select the required Monitor profile. A frame appears around the key indicating that it is selected.
   - If no bullet appears in the label, press Show/Hide. The green bullet appears and the Monitor profile will appear on the main screen the next time you want to admit a patient.
   - If a green bullet appears in the label, press Show/Hide. The bullet disappears and the Monitor profile is removed from the main screen.

5.10.2 Changing the Position of an Monitor profile

The Monitor profiles are arranged on the Monitor profile panel in the positions where they will appear on the main screen. You can move the keys to the most convenient position.

➢ ***To move a Monitor profile:***

1. In the Monitor profiles panel, press Select Key.
2. Turn the QuicKnob and press the key you want. A frame appears around the key, indicating that it is selected.
3. Press Right to move the selected Monitor profile clockwise

– or –

press **Left** to move the key counterclockwise.

5.10.3 Clearing a Monitor profile

A previously defined Monitor profile may no longer suit your monitoring needs. In that case you can simply clear the Monitor profile from the Envoy.

➢ ***To clear a Monitor profile:***

1. **In the** Monitor profiles **panel, press** Select Key.
2. Turn the QuicKnob until you reach the key you want to clear and press. A frame appears around the selected key.
3. Press Clear. The Monitor profile is removed from the Monitor profiles panel and will no longer appear on the main screen when admitting a patient.

5.11 Admit by Default

This panel enables you to admit a patient by a factory set (Mennen Medical) Default monitor profile. You can only use this option after the patient has been discharged.

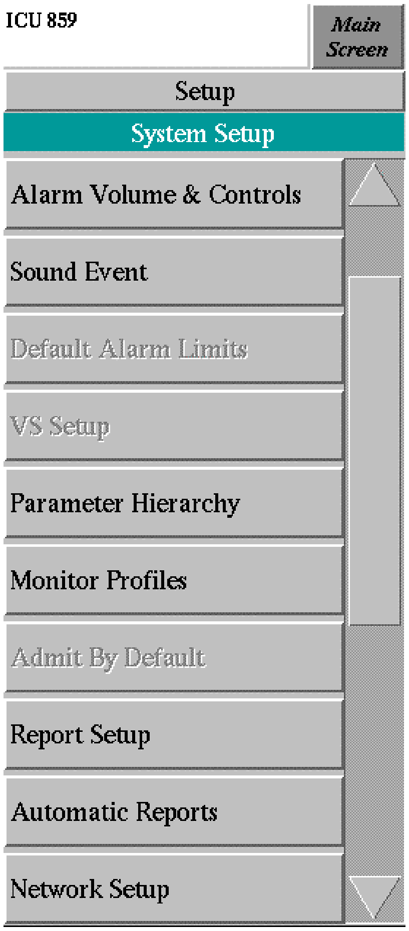

ICU 859
Main Screen
Setup
System Setup
Alarm Volume & Controls
Sound Event
Default Alarm Limits
VS Setup
Parameter Hierarchy
Monitor Profiles
Admit By Default
Report Setup
Automatic Reports
Network Setup

Figure 5-26 The Admit by Default Setup Panel

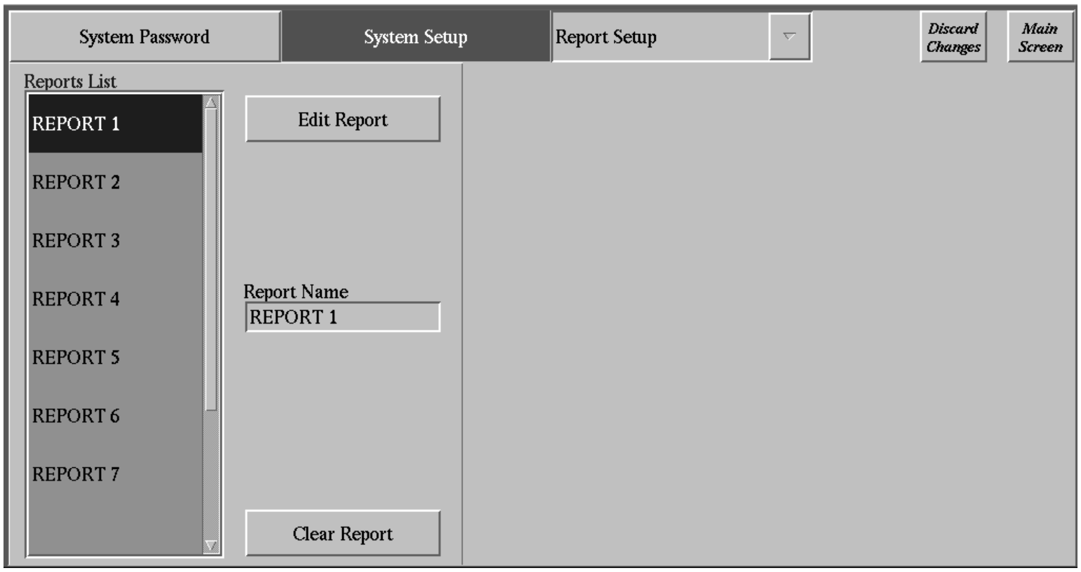
➢ ***To admit by Default:***

4. Discharge the patient
5. Select System Setup
6. From the System Setup menu, select Admit by Default

5.12 Report Setup

In order to review patient data, the Envoy generates reports. You can name and define the format for up to 10 types of reports. Reports are configured in the Report Setup dialog panel. All available reports appear in the Reports List. You can configure and edit the format for each report, rename it, and clear the report from the Report List. All reports can be printed and placed in the patient's records.

For example, if you want to set up a report for Hemodynamics, you might first name a report "Hemodynamics" and then, in Edit Report, set up the format for the "Hemodynamics" report. For each report, specify whether the report type is "Charts" or "Trends".


System Password
System Setup
Report Setup
Discard Changes
Main Screen
Reports List
REPORT 1
REPORT 2
REPORT 3
REPORT 4
REPORT 5
REPORT 6
REPORT 7
Edit Report
Clear Report

Report Name: REPORT 1

Figure 5-27 The Report Setup Dialog Panel

5.12.1 Naming a Report

By default, reports are named Report 1, Report 2, etc. You can change the name of any report according to what is accepted practice in your hospital or department.

➢ ***To rename a report:***

1. In the **System Setup** menu, select **Report Setup**.
2. From the **Reports List**, select a report.
3. Select the **Report Name** textbox. The alphanumeric keyboard panel is displayed. Enter the new report name and close the panel. The new report name now appears on the **Reports List**.

5.12.2 Editing a Report

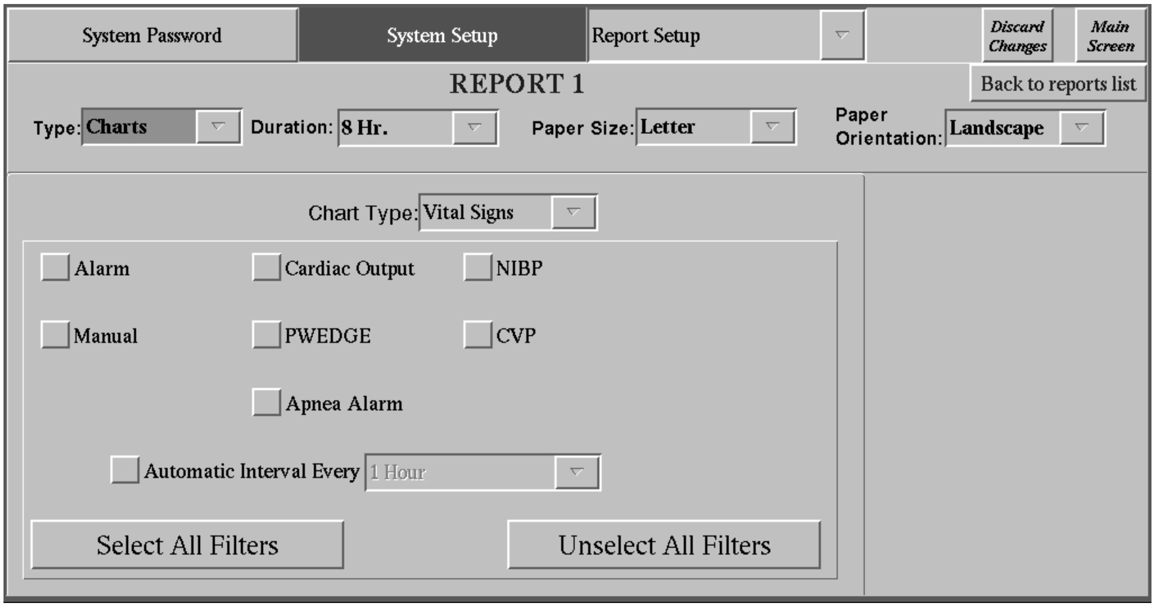
When you edit a report, you define its type, duration and layout. You can select from one of two report types: **Charts**, or **Trends**.

5.12.2.1 *Charts*

A chart documents a patient's condition as observed at regular intervals in table format, much in the same way as a nurse records data in a bedside chart. The Envoy supports the following set of clinical charts for the purpose of data acquisition, clinical calculations and review.

- **Hemodynamics**
- **Respiration**
- **Oxygenation**
- **Renal Clearance**
- **User Defined Charts (with the name as given in Tabular Charts)**

The format of the User Defined chart can be edited. All other charts have a fixed format.


System Password
System Setup
Discard Changes
Main Screen
Back to reports list
☐ Alarm
☐ Cardiac Output
☐ NIBP
☐ Manual
☐ PWEDGE
☐ CVP
☐ Apnea Alarm
Select All Filters
Unselect All Filters

Report Setup

REPORT 1

Type: Charts

Duration: 8 Hr.

Paper Size: Letter

Paper Orientation: Landscape

Chart Type: Vital Signs

☐ Automatic Interval Every 1 Hour

Figure 5-28 Setting Up a Chart-Type Report

➢ ***To edit the format of a Vital Signs chart-type report:***

1. From the **System Setup** menu, select **Report Setup**.
2. From the **Report List**, select a report.
3. Select **Edit Report**. The **Edit Report** dialog panel is displayed.

4. In the **Type** drop-down list, select **Chart**.
5. From the **Duration** drop-down list, select the time period during which data is collected for the chart.
6. From the **Paper Size** drop-down list, select the size of the paper you want the report printed out on. Available options are; **Letter**, **Legal**, **Executive**, **A4**, and **A3**.
7. From the **Paper Orientation** drop-down list, select **Portrait** (vertical orientation) or **Landscape** (horizontal orientation).
8. From the **Chart Type** drop-down list, select **Vital Signs**.
9. Press **Select All Filters** for all available filters to be included in the chart
   –or–
   Press **Unselect All Filters** and select only those filters you want to include in the chart. The available filters are; **Alarm**, **Manual**, **Cardiac Output**, **PWedge**, **Apnea Alarm**, **NIBP**, and **CVP**.
10. Select **Discard Changes** to close the panel without applying any changes
    –or–
    select **Main Screen** to apply your changes and return to the blank screen.

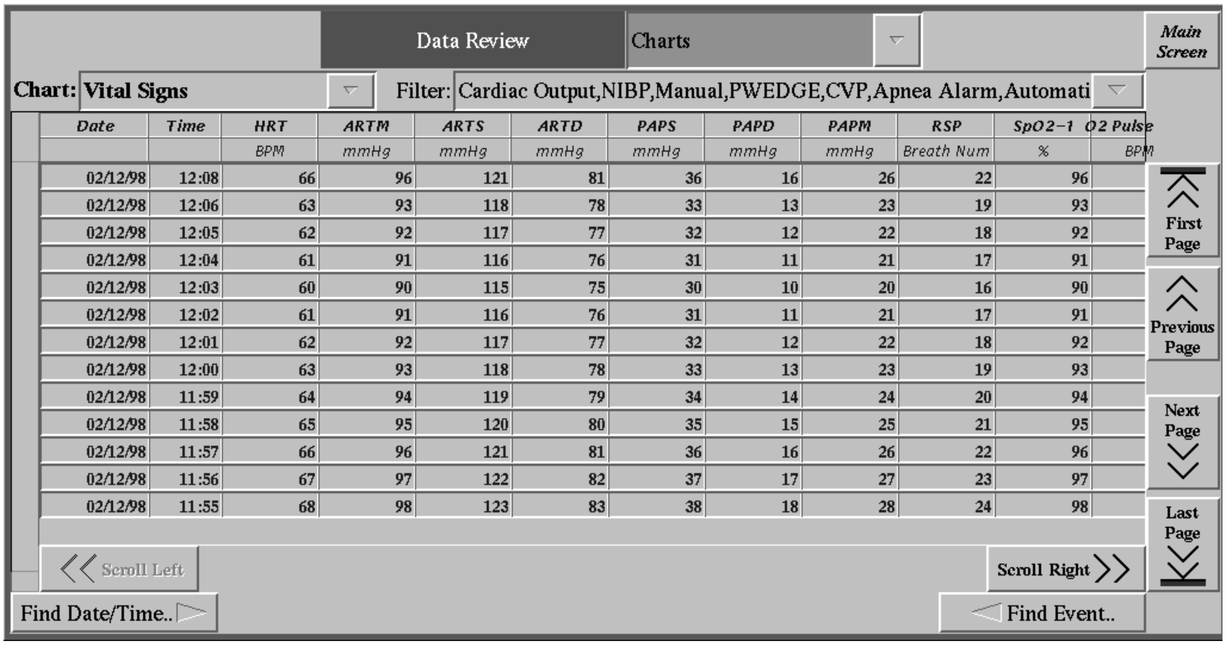


Chart: Vital Signs

Filter: Cardiac Output,NIBP,Manual,PWEDGE,CVP,Apnea Alarm,Automati

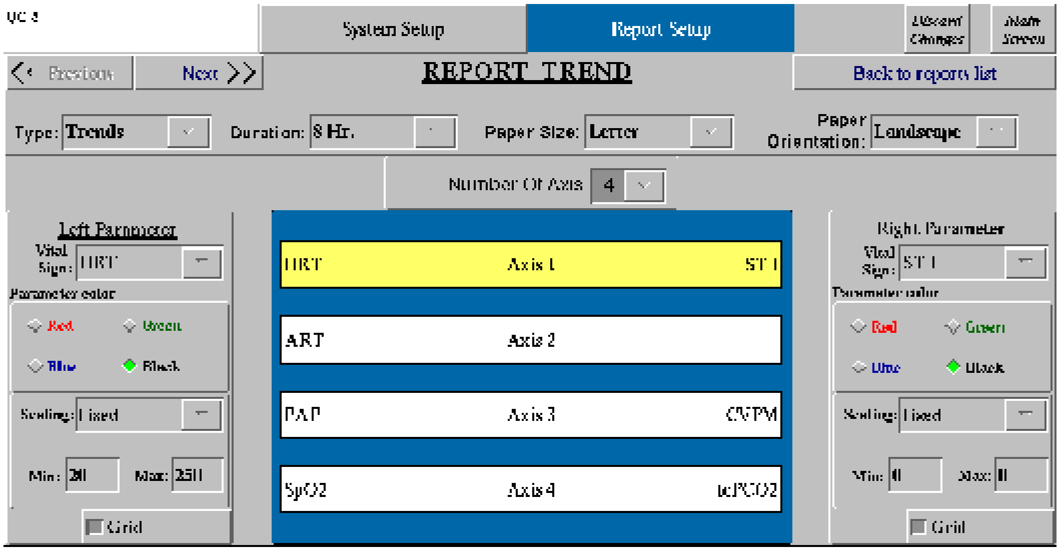
Date	Time	HRT	ARTM	ARTS	ARTD	PAPS	PAPD	PAPM	RSP	SpO2-1	O2 Pulse
		BPM	mmHg	mmHg	mmHg	mmHg	mmHg	mmHg	Breath Num	%	BPM
02/12/98	12:08	66	96	121	81	36	16	26	22	96	
02/12/98	12:06	63	93	118	78	33	13	23	19	93	
02/12/98	12:05	62	92	117	77	32	12	22	18	92	
02/12/98	12:04	61	91	116	76	31	11	21	17	91	
02/12/98	12:03	60	90	115	75	30	10	20	16	90	
02/12/98	12:02	61	91	116	76	31	11	21	17	91	
02/12/98	12:01	62	92	117	77	32	12	22	18	92	
02/12/98	12:00	63	93	118	78	33	13	23	19	93	
02/12/98	11:59	64	94	119	79	34	14	24	20	94	
02/12/98	11:58	65	95	120	80	35	15	25	21	95	
02/12/98	11:57	66	96	121	81	36	16	26	22	96	
02/12/98	11:56	67	97	122	82	37	17	27	23	97	
02/12/98	11:55	68	98	123	83	38	18	28	24	98	

Figure 5-29 An Example of a Charts Report Showing All Filters

5.12.2.2 Trends

Trends allows you to review data in a graphic representation rather than just a list of numbers. Trends represents changes in vital signs over time. Comparing the patterns of change gives an indication of the patient's progress.

For each trend-type report, up to four axes can be presented. Each axis includes a left vital sign parameter and a right vital sign parameter for 8 parameters in total. In the Edit Report panel, you can see a preview of the report as you configure it. Each parameter appearing in the report can be configured to appear in a different color. The available colors are; red, black, green, and blue. Scaling can be configured as fixed or dynamic. You can also define that the data appear on a grid background to make reading the graph easier.


System Setup
Report Setup
Discard Changes
Main Screen
<< Previous
Next >>
Back to reports list
Left Parameter
Parameter color
○ Red
○ Green
○ Blue
● Black
Right Parameter
Parameter color
○ Red
○ Green
○ Blue
● Black

REPORT TREND

Type: Trends

Duration: 8 Hr.

Paper Size: Letter

Paper Orientation: Landscape

Number Of Axis 4

Left Parameter Vital Sign: HRT

Scaling: Fixed

Min: 20 Max: 250

☐ Grid

HRT	Axis 1	ST I
ART	Axis 2	
PAP	Axis 3	CVPM
SpO2	Axis 4	tcPCO2

Right Parameter Vital Sign: ST I

Scaling: Fixed

Min: 0 Max: 0

☐ Grid

Figure 5-30 The Report Setup Dialog Panel Displaying a Trend Report

➢ ***To edit the format of a trends-type report:***

1. From the **System Setup** menu, select Report Setup.
2. From the **Report List**, select a report.
3. Select **Edit Report**. The **Edit Report** dialog panel is displayed.
4. In the **Type** drop-down list, select **Trends**.
5. From the **Duration** drop-down list, select the time period during which data is collected for the chart.
6. From the **Paper Size** drop-down list, select the size of the paper you want the report printed out on. Available options are; **Letter**, **Legal**, **Executive**, **A4**, and **A3**.
7. From the Paper Orientation drop-down list, select Portrait (vertical orientation) or Landscape (horizontal orientation).

8. Select the number of axes to appear in the trend report. Up to eight axes can be presented. Each axis contains a left parameter and a right parameter.
9. Select an axis and define its left and right parameters:
10. From the **Vital Sign** drop-down list, select the vital sign for the left or right parameter.
11. Under Parameter Color, select the required color.
12. From the **Scaling** drop-down list, select **Fixed**, or **Dynamic**.
13. When Fixed Scaling is selected, turn the QuicKnob and select the min./max scaling values, as required.
14. Select or clear the Grid checkbox to activate or deactivate display of the trended data on a grid.
15. Select **Discard Changes** to close the panel without applying any changes
    –or–
    select **Main Screen** to apply your changes and return to the blank screen.

5.12.3 Clearing a Report From the Reports List

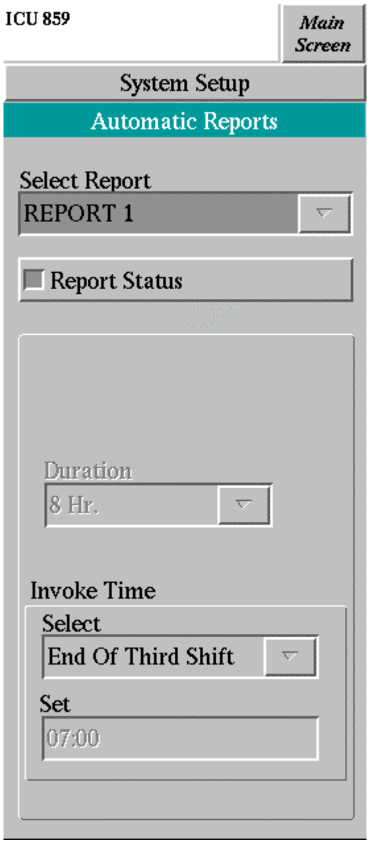
➢ ***To clear a report from the Reports List:***

1. From the System Setup menu, select Report Setup.
2. From the Report List, select the report you want to remove from the list.
3. Press Clear Report. The Report is removed from the Reports List and the undefined Report# appears in its place.

5.12 Automatic Reports

This function is only available if a printer was selected in Network Setup.

This panel enables you to activate the automatic printout of reports at a pre-selected time daily.



Select Report
REPORT 1

☐ Report Status

Duration
8 Hr.

Invoke Time
Select
End Of Third Shift
Set
07:00

Figure 5-31 The Automatic Reports Setup Panel

To set Automatic Reports Setup Panel

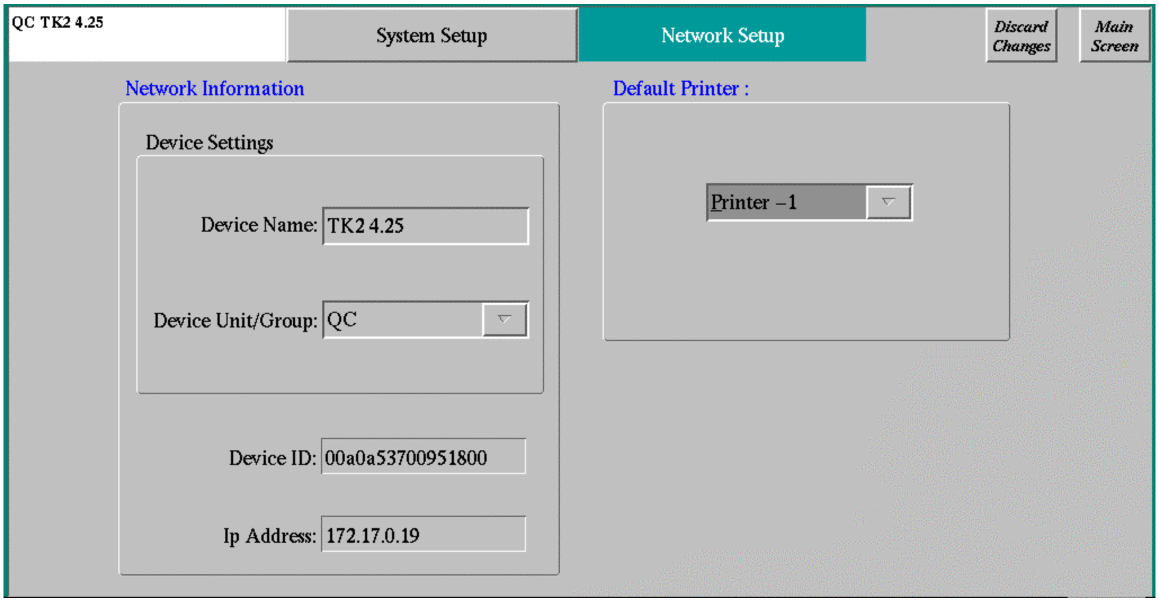
6. Select **System Setup**
7. From the **System Setup** menu, select **Automatic Reports**
8. Select the report for automatic printing
9. Select the invoke time, either at the end of one of the three shifts, or at a “user defined time”.

Note: Each selected report can be printed automatically only once daily.

5.13 Network Setup

The Network Setup panel is used to name a device and to name and define which unit each device is associated with. You can associate a device with each of the units located on the network, or you can create a new unit and assign to it a device.

The panel also displays the device ID number and IP address as defined during manufacturing. If a printer is located on the LAN, you can enable the printer for the device.



Device Name: TK2 4.25

Device Unit/Group: QC

Device ID: 00a0a53700951800

Ip Address: 172.17.0.19

Printer –1

Figure 5-32 The Network Setup Dialog Panel

➢ ***To configure Network Setup:***

1. In the System Setup menu, click Network Setup.
2. Click in the Device Name text box and select a device, or enter the name of the device with the alphanumeric keypad.
3. Click in the Device Unit/Group text box and select a unit from the list of units located on the network. To create a new unit, select the Manual option and using the alphanumeric keypad type the name of the new unit or group.
4. Click the Printer checkbox if you wish to use the printer and select the printer to be used.
5. Select Discard Changes to close the panel without applying any changes,
   –or–
   Select Main Screen to apply the changes and close the panel.

5.14 Recorder Setup

If the Envoy is connected to a network, it can be set up to send a recording to a defined list of recorders or printers located on the network. The Envoy supports five recording types, each of which can be configured to send recordings to different recorders or printers, as is convenient for the user. These recording types are:

- **Manual Recording**

A manual recording is initiated by the user at the bedside. The user can select a real-time or delayed recording and can select from the following recording durations: 20, 30, 45, and 60 sec. or Continuous.

- **Alarm Recording**

A recording triggered by an alarm documenting the ECG waveforms, all VS values and the waveform of the clinical parameter which triggered the alarm (when not ECG). When using a dual channel recorder, the first channel is always ECG1. For the second channel, you can select ECG2 or any other parameter that produces a waveform.

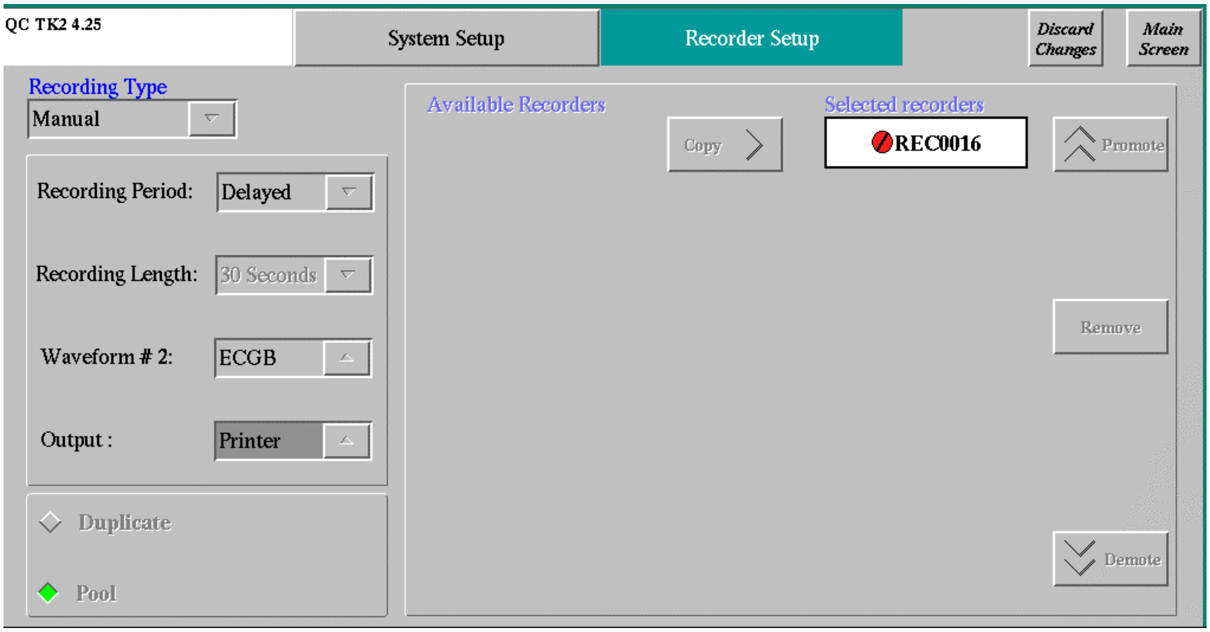
- **Selective Recording**

In a selective recording, the user defines which waveforms to record. The following recording durations can be selected: 20, 30, 45, or 60 sec.

- **Remote Recording**

Enables selection of two waveforms. Remote recording is initiated from remote devices, such as the Enguard or Ensemble Nurse Station.

Each recording type has its own characteristics. If the Envoy is on a network and a number of different recorders at different locations are available, you can assign specific recorders to specific recording types. For example, manual alarms can be sent to a local recorder located next to the Envoy, while alarm and all-waveform recordings can be sent to a Central Nurse Station.


QC TK2 4.25
System Setup
Recorder Setup
Discard Changes
Main Screen
Available Recorders
Selected recorders
Copy
Promote
Remove
Demote

Recording Type: Manual

Recording Period: Delayed

Recording Length: 30 Seconds

Waveform # 2: ECGB

Output : Printer

◇ Duplicate

◆ Pool

Selected recorders: REC0016

Figure 5-33 The Recorder Setup Dialog Panel

5.15 Trends Setup

See page 5-84 at the end of this chapter.

5.16 Quick Keys Setup

Note: This dialog panel is active only when a patient is being monitored.

The Quick Keys bar is a row of up to 12 user-defined function keys that appear on the bottom of the main screen display.

This panel provides you with quick access to your most frequently used functions and menus. For example, if you want to access the Charts panel, instead of pressing the Data Review fixed key on the front panel and then selecting Charts from the Data Review menu, you can simply turn the QuicKnob until the Charts Quick Key is highlighted and press to display the Charts panel. Any function can be configured as a Quick Key. Quick Keys are configured by your hospital biomedical engineer or System Administrator in System Configuration.

Note: Quick Keys disappear from the screen every two minutes. To redisplay the Quick Keys, simply turn the QuicKnob.

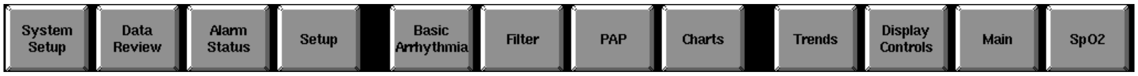

System Setup
Data Review
Alarm Status
Setup
Basic Arrhythmia
Filter
PAP
Charts
Trends
Display Controls
Main
SpO2

Figure 5-34 The Quick Keys Bar.

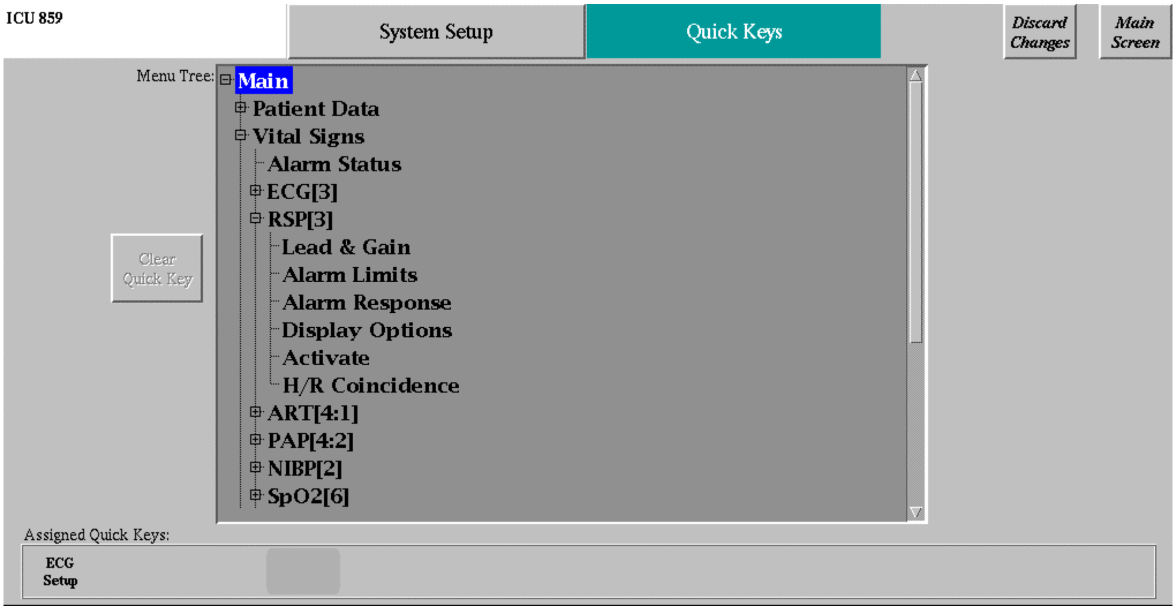

ICU 859
System Setup
Quick Keys
Discard Changes
Main Screen
Menu Tree:
Main
Patient Data
Vital Signs
Alarm Status
ECG[3]
RSP[3]
Lead & Gain
Alarm Limits
Alarm Response
Display Options
Activate
H/R Coincidence
ART[4:1]
PAP[4:2]
NIBP[2]
SpO2[6]
Clear Quick Key
Assigned Quick Keys:
ECG Setup

Figure 5-35 The Quick Keys Setup Panel

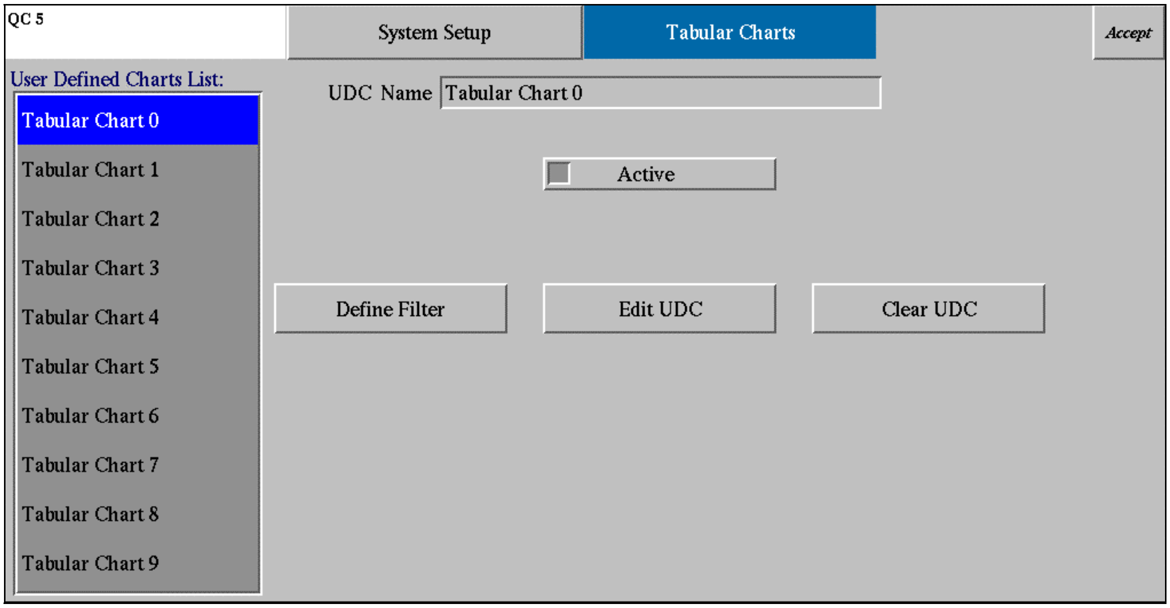
➢ ***To assign a Quick Key***

1. Select **System Setup**
2. From the System Setup menu, select Quick Keys
3. Use the "Quicknob" to select one of the Quick Keys – this opens a menu with a green background
4. Press and rotate the "Quicknob" to open the menu item and open the sub menus
5. Select the function that you wish to assign – press the "Quicknob" to finish the assignment.

5.17 Tabular Charts

A chart documents a patient’s condition as observed at regular intervals in table format, much in the same way as a nurse records data in a bedside chart. The ***Envoy*** supports a set of clinical charts for the purpose of data acquisition, clinical calculations and review (For more details, see 5.8 “***Report Setup***” on page 5-49)

The ***Envoy*** also enables to create **User Defined Charts** (UDF), customized to specific needs of a unit or patient. This is done in the Tabular Charts panel. Up to 10 User Defined charts can be defined in System Setup. You can define the parameters that appear in the UDC, edit the format of a UDC, rename it, and clear a UDC from the User Defined Charts List. All UDCs can be printed and placed in the patient’s records.


QC 5
System Setup
Tabular Charts
Accept
User Defined Charts List:
Tabular Chart 0
Tabular Chart 1
Tabular Chart 2
Tabular Chart 3
Tabular Chart 4
Tabular Chart 5
Tabular Chart 6
Tabular Chart 7
Tabular Chart 8
Tabular Chart 9
☐ Active
Define Filter
Edit UDC
Clear UDC

UDC Name Tabular Chart 0

Figure 5-36 The Tabular Charts Dialog Panel

5.17.1 Naming a UDC

By default, User Defined Charts are named Tabular Chart 1, Tabular Chart 2, etc. You can change the name of any tabular chart according to what is accepted practice in your hospital or department.

➢ ***To rename a Tabular chart:***

29. In the System Setup menu, select Tabular Charts. The Tabular Charts panel opens.
30. From the **User Defined Charts List**, select a tabular chart.
31. Select the **UDC Name** textbox. The alphanumeric keyboard panel is displayed. Enter the new UDC name and close the

panel. The new chart name now appears in the **User Defined Charts List**.

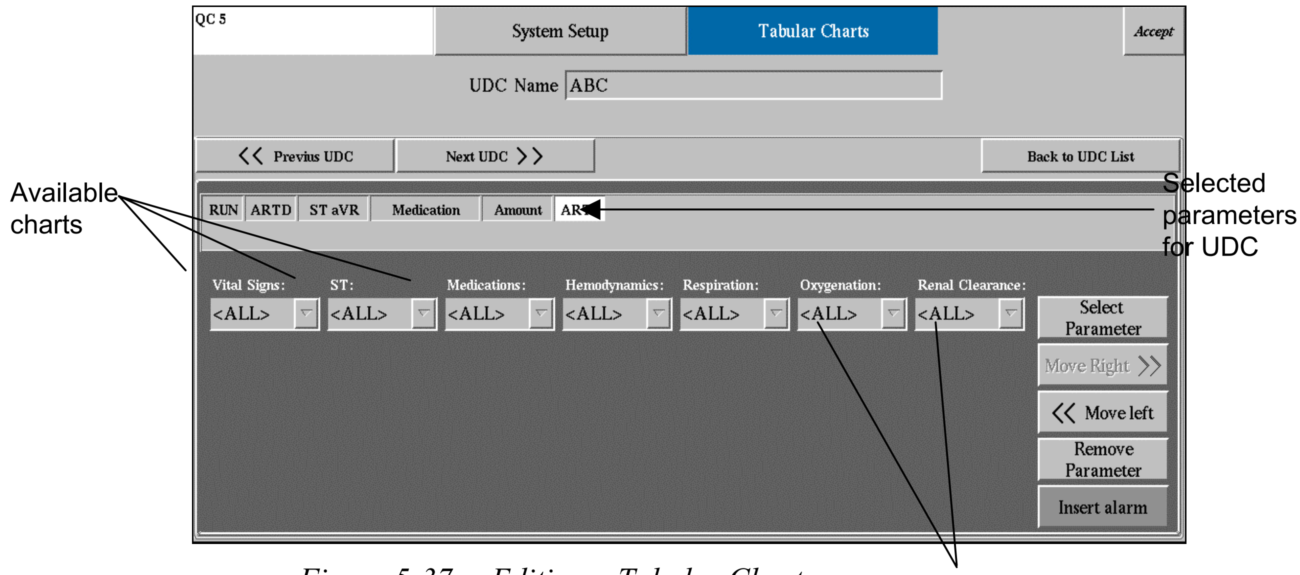
5.17.2 Editing a UDC

Editing a User Defined Chart includes the following procedures:

- Defining the parameters to appear in the chart. The parameters can be selected from any of the available parameters associated with the ***Envoy*** predefined charts.
- Defining the order in which the parameters will appear in the chart.
- Defining an alarm column for display of clinical alarms for the selected parameters.
- Defining filters – the conditions according to which entries are added to the chart. The available filters are:
- Manual - Chart entries based on a manually selected event.
- Alarm - Chart entries when an alarm is triggered.
- Cardiac Output - A chart entry each time a cardiac output reading occurs.
- PCWP - A chart entry each time a pulmonary wedge reading occurs.
- NIBP - A chart entry each time a NIBP reading occurs.
- CVP - A chart entry each time a VCP reading from the PAP channel occurs.
- Apnea - A chart entry each time an apnea event occurs.
- Time Interval - Chart entries based on a defined time interval.

➢ ***To edit a User Defined Chart:***

1. From the **System Setup** menu, select **Tabular Charts**. The **Tabular Charts** panel opens.
2. From the **User Defined Charts List**, select a chart and click the **Edit UDC** button. An editing dialog panel appears, displaying all available charts supported by the ***Envoy***, and the parameters associated with each.


QC 5
System Setup
Tabular Charts
Accept
Previus UDC
Next UDC
Back to UDC List
RUN
ARTD
ST aVR
Medication
Amount
ART
Vital Signs:
ST:
Medications:
Hemodynamics:
Respiration:
Oxygenation:
Renal Clearance:
<ALL>
<ALL>
<ALL>
<ALL>
<ALL>
<ALL>
<ALL>
Select Parameter
Move Right
Move left
Remove Parameter
Insert alarm

UDC Name ABC

Available charts

Selected parameters for UDC

Figure 5-37 Editing a Tabular Chart

List of available parameters for each chart

3. Click the arrow beneath a category (chart name), and from the list of parameters available for the category select the required parameters for the UDC. The selected parameters appear on the bar above.
4. To define the order of parameters in the UDC, click on a selected parameter and then click the **Move left** or **Move right** buttons until the parameter reach the required location. If you want to remove any of the selected parameters, select the parameter and click **Remove Parameter**.
5. To display alarms, click the **Insert alarm** button.
6. Click **Accept** to apply your changes and return to the **Tabular Charts** panel.

Note: *If you want to return to the **Tabular Charts** panel without applying any changes, click **Back to UDC List**.*
*If you want to move to the next or to the previous UDC in the list, click **Next UDC** or **Previous UDC** accordingly.*

7. To set filters, in the **Tabular Charts** panel click the **Define Filter** button. A window opens displaying all available filters.

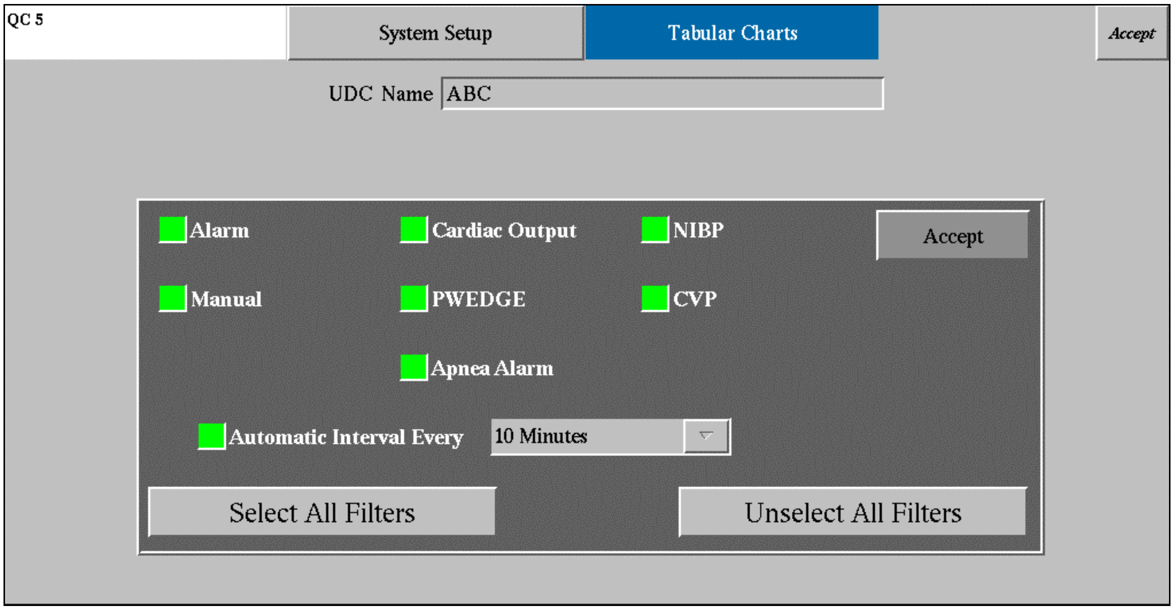

QC 5
System Setup
Tabular Charts
Accept
UDC Name ABC
🟩 Alarm
🟩 Cardiac Output
🟩 NIBP
Accept
🟩 Manual
🟩 PWEDGE
🟩 CVP
🟩 Apnea Alarm
🟩 Automatic Interval Every 10 Minutes
Select All Filters
Unselect All Filters

Figure 5-38 Defining the Filters

8. Press **Select All Filters** for all available filters to be included in the chart
   –or–
   Press **Unselect All Filters** and select only those filters you want to include in the chart.
9. Click **Accept** to apply the changes and return to the **Tabular Charts** panel. The new UDC appears in the **User Defined Charts** list.

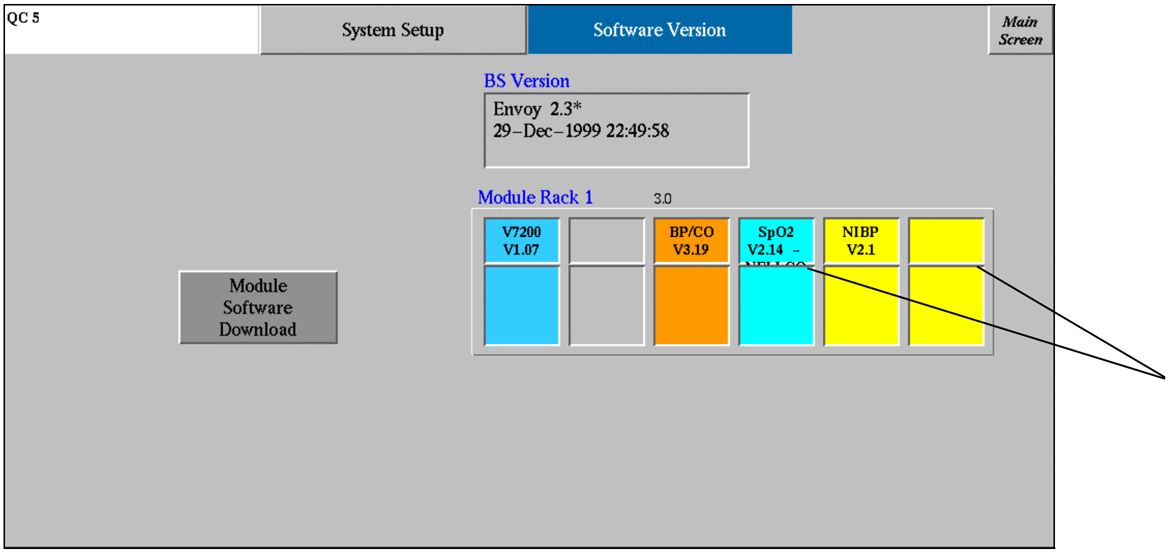
5.17.3 Clearing a UDC From the UDC List

➢ ***To clear a UDC from the UDC List:***

1. From the System Setup menu, select Tabular Charts.
2. From the **User Defined Charts List**, select the UDC you want to remove from the list.
3. Press **Clear UDC**. The **UDC** is removed from the User Defined Charts List and the undefined Tabular Chart# appears in its place.

5.18 Software Version

The **Software Version** panel displays the software version of the bedside monitor, the module rack, and all modules located in the Module Rack. It also allows you to download the software for the modules.


QC 5
System Setup
Software Version
Main Screen
BS Version
Module Rack 1
3.0
V7200 V1.07
BP/CO V3.19
SpO2 V2.14 –
NIBP V2.1
Module Software Download

BS Version

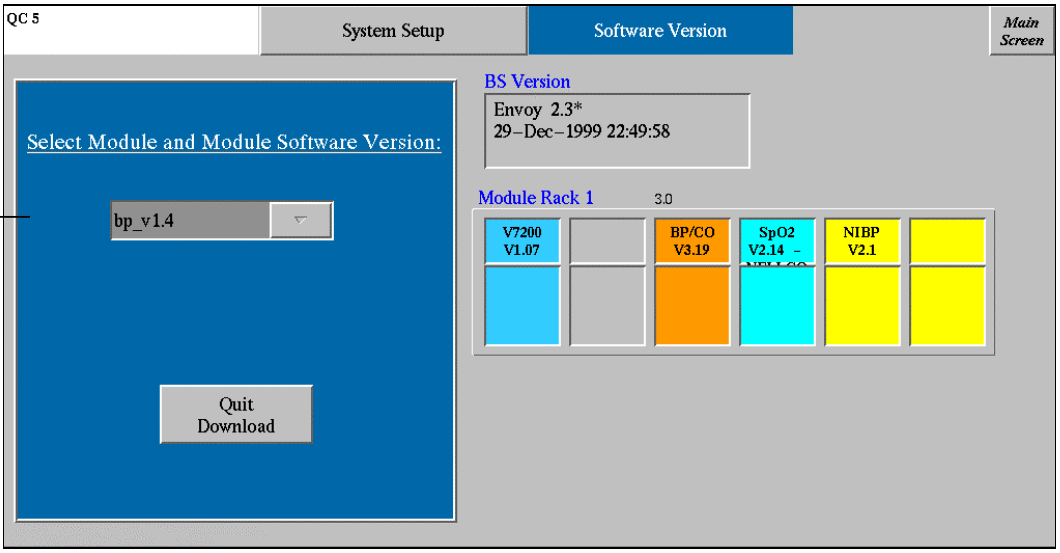
Envoy 2.3*
29–Dec–1999 22:49:58

Modules on current module rack

Figure 5-39 The Software Version Panel

➢ ***To download module software:***

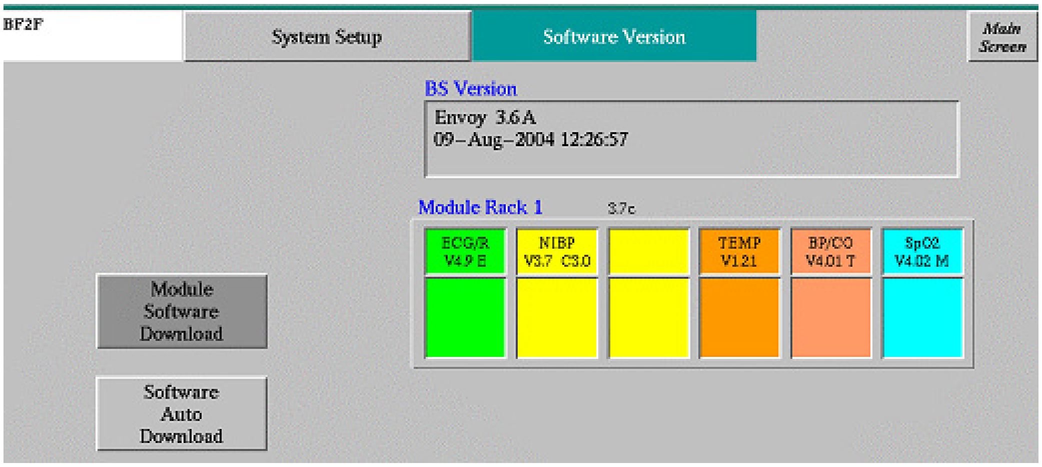
1. From the **System Setup** menu, select **Software Version**. The **Software Version** panel appears, displaying modules in the module rack and their software version.
2. Click the **Module Software Download** button. A window with a list box containing software versions for all existing modules appears.


QC 5
System Setup
Software Version
Main Screen
Select Module and Module Software Version:
bp_v1.4
Quit Download
BS Version
Module Rack 1
3.0
V7200 V1.07
BP/CO V3.19
SpO2 V2.14 -
NIBP V2.1

Envoy 2.3*
29–Dec–1999 22:49:58

List of software versions for all modules

Figure 5-40 Selecting the Software Version


BF2F
System Setup
Software Version
Main Screen
BS Version
Module Rack 1
3.7c
ECG/R V4.9 E
NIBP V3.7 C3.0
TEMP V1.21
BP/CO V4.01 T
SpO2 V4.02 M
Module Software Download
Software Auto Download

Envoy 3.6A
09–Aug–2004 12:26:57

Figure 5-40 b Software version Panel (Envoy S.W. higher than v3.0)

3. Click the arrow and select the software version that you want to download. On the right side of the window the appropriate module is surrounded by a frame. Make sure to select a software version for a model that exists on the module rack.

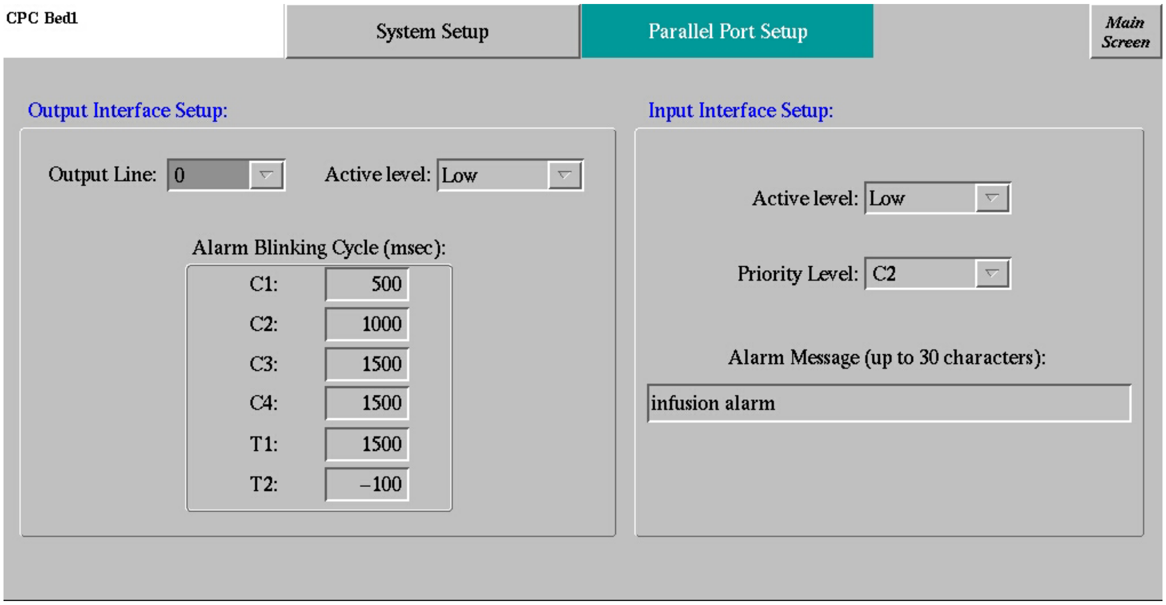
4. Press the **QuickKnob**. A message appears, requesting you to confirm the upgrade of the software.

5. Click **Yes** to download the software.

6. Select **Main Screen** to close the panel.

5.19 Parallel Port Setup

Use this panel to configure the alarm output and alarm input via the parallel input/output port.



Output Interface Setup:

Output Line: 0

Active level: Low

Alarm Blinking Cycle (msec):

C1:	500
C2:	1000
C3:	1500
C4:	1500
T1:	1500
T2:	–100

Input Interface Setup:

Active level: Low

Priority Level: C2

Alarm Message (up to 30 characters):

infusion alarm

Figure 5-41 Parallel Port Setup Panel

➢ ***To configure the alarm output:***

1. Select the Output line between 0 and 7 in the Parallel Port Setup panel
2. For the Active Level select either High or Low, or disable the alarm output
3. Set The Alarm Blinking cycle between 100 and 10000 mSec cycle time.

   Negative cycle means NO alarm output and Zero cycle time means continuous output for alarm

To configure the alarm input:

7. Select the Input Active Level (High or Low) in the Parallel Port Setup panel, or disable the alarm input
8. Set the Priority of the input alarm between C1, C2, C3, C4, T1, T2
9. Select the Alarm message box – this opens a virtual keyboard on the Envoy screen
10. Print the Message you would like to receive in the event of an external device alarm and press accept.

5.20 Envoy Interface Setup

To use the Envoy with the Ensemble EN Central Station, the monitor has to receive a "Network Number" in the common network of Enmoves and Envoys,

To set the "Network Number" enter: System Setup >> Enmove Interface Setup and give the monitor a "Network Number" between 1 and 64.

The "Network Number" is displayed in System Setup >> Network Setup under the heading: Envoy to MCS interface

Caution: Each of the monitors Envoy's and Enmove's must have a different Network Number.

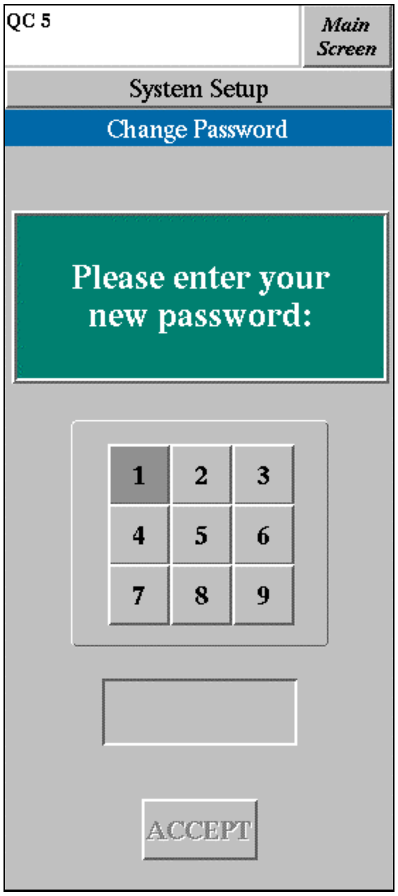
Note: *All Envoy monitor with software version* ***3.6*** *and up can be monitors on Ensemble EN Central Nurse Station*

5.21 Change Password

The Change Password option allows you to change the password that enables access to the System Setup menu. Access to the System Setup menu is limited to authorized personnel, such as a System Administrator or Hospital Biomedical Engineer.

➢ ***To change the password:***

11. In the System Setup menu, click Change Password. The Change Password panel opens.


QC 5
Main Screen
System Setup
Change Password

Please enter your new password:

1
2
3
4
5
6
7
8
9
ACCEPT

Figure 5-42 Changing the Password

12. Enter the new password (3 digits) and click **Accept**.

13. A panel appears requesting you to type the password again. Type the password again and click **Accept**.

5.22 Check Disk

When running Check Disk, all patient information on the disk is erased.

⚠ *Warning! Avoid using this option.*

➢ ***To run Check Disk:***

1. In the **System Setup** menu, select **Check Disk**.

5.23 Permission Editor

In the Permission Editor panel you can define which ***Envoy*** functions are available. By default, access to all functions is available. However, you can configure certain functions to be unavailable. For example, you can decide that at a certain station recording of vital signs data cannot be performed. The Permission Editor displays the entire ***Envoy*** menu in tree format, and allows you to define, for each menu option, whether it is available or unavailable for the current ***Envoy***.

The following modes can be set for each menu option:

- **On** - select this checkbox to activate the menu option. The option appears in the appropriate panel and can be accessed.
- **Off** - select this checkbox to remove the menu option from the appropriate panel. The option cannot be accessed.
- **Dimmed** - select this checkbox when you want the menu option to appear dimmed on the panel. The option cannot be accessed.

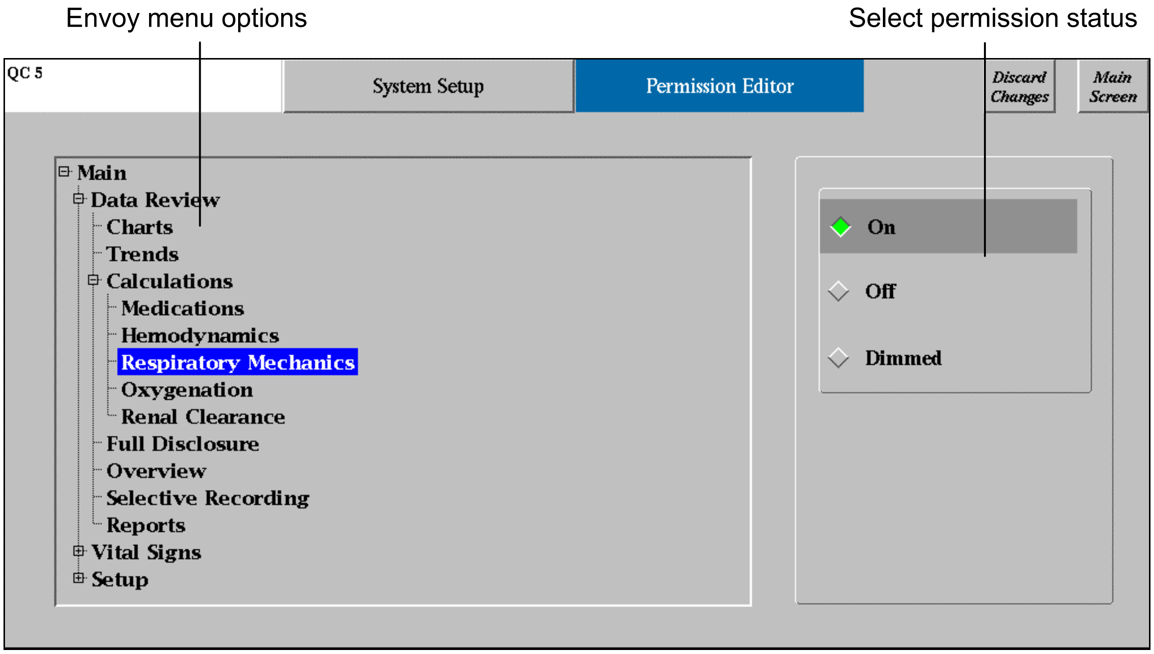

Envoy menu options
Select permission status
QC 5
System Setup
Permission Editor
Discard Changes
Main Screen
Main
Data Review
Charts
Trends
Calculations
Medications
Hemodynamics
Respiratory Mechanics
Oxygenation
Renal Clearance
Full Disclosure
Overview
Selective Recording
Reports
Vital Signs
Setup
On
Off
Dimmed

Figure 5-43 The Permission Editor Panel

➢ ***To define permission for a menu option:***

1. From the **System Setup** menu, select **Permission Editor**. The **Permission Editor** panel appears displaying (+) **Main.**
2. If you use a mouse , click the plus (+) icon that appears to the left of a menu item to access the menu level below that listed on the screen. Any item from any level can be selected when assigning permission.
3. If you use a Quicknobe Press and rotate simultaneously, clockwise on (+) Main to access the menu level below that listed on the screen.
4. Press and rotate clockwise on the next level (+) item to access the menu level below that listed on the screen.
5. Select the required menu item, by pressing the Quicknob and then rotate to select the permission status for the item.
6. Repeat step 3 until defining permission for all the menu option that you want.
7. Click **Main Screen** to apply changes and close the panel.

5.24 Remove Saved Patients

Use this panel to view the list of patients with data saved in the Envoy monitor.

➢ ***To delete a patient from the list***

Select the patient row - this opens a list of the following options:

- Delete - to delete the patient from the list
- Sort the list, or
- Close

Note that the data of a patient that is deleted from the list is LOST and cannot be retrieved.

5.25 Trends Setup

This dialog panel enables you to set the scales to be used in the graphic trend for each vital sign

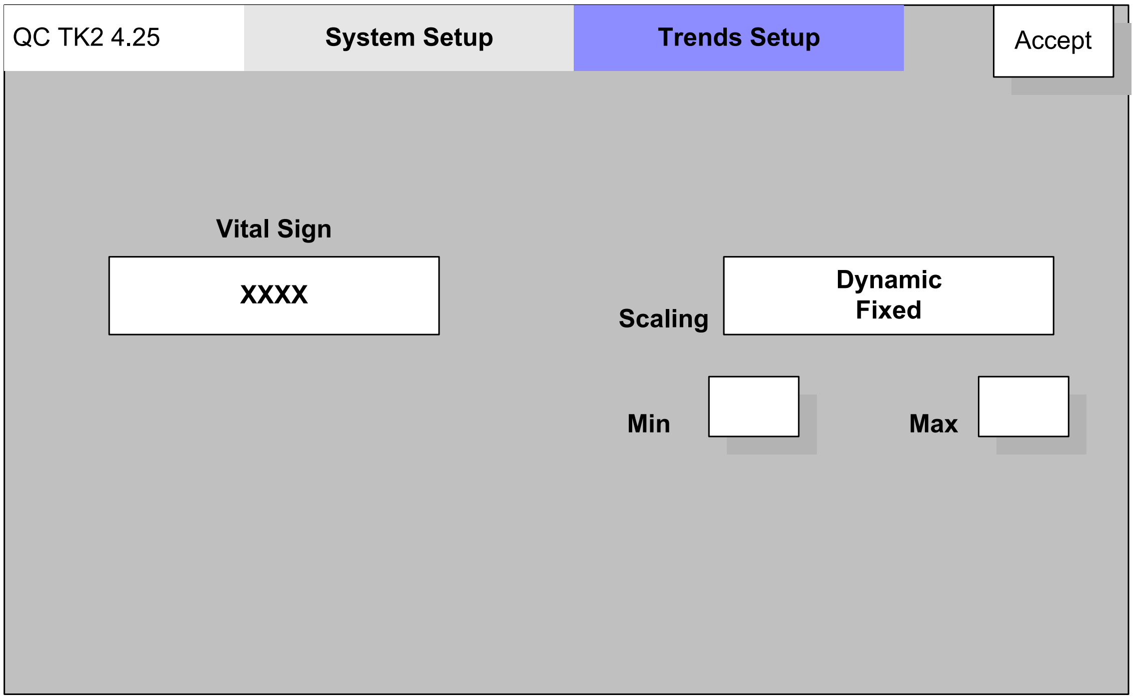

QC TK2 4.25
System Setup
Trends Setup
Accept
Vital Sign
XXXX
Scaling
Dynamic
Fixed
Min
Max

Figure 5-44 The Trends Setup Dialog Panel

Two scaling options are available: Fixed and Dynamic.

If the Fixed option is selected, the scales of the Trend graph will be fixed and independent of the input data.

In the Dynamic option, the scale of the trend graph will depend on the maximal and minimal parameter values from the patient admission.

➢ ***To modify Trends Setup:***

1. Select **Trends Setup** from the **System Setup** menu - a large panel will open.
2. On the left of the panel open the "Vital Sign" window - a list of vital signs appears.
3. Select a parameter - for example RSP.
4. In the **Scaling** window select either "Fixed" or "Dynamic"
5. If you select **Fixed,** set the **Min** (minimum) and the **Max** (maximum) limits of the trend scale.
6. If you select **"Dynamic"** the Min and Max values will be dimmed and will show the maximal and minimal limits of the dynamic scaling.
7. Click on **Accept** to accept the selected settings.

Chapter 6:

Setting up the Server

This chapter includes instructions on how to setup the Server for the display of Laboratory results on the Envoy bedside monitor.

6.1 Introduction:

In order to view laboratory results on the Envoy monitor, the Envoy needs to operate with the following configuration:

- Envoy monitor with option: Remote Interactive Terminal (P/N 550-OPT-078) and Database Connectivity
- Server for interface between Envoys and HIS and LIS
- Hospital information System (HIS) and Laboratory Information System (LIS) that use HL7 communication protocols.

Prior to installation, Mennen Medical needs to perform a system survey.

The system may require customization, in which case Mennen Medical will provide a quotation.

6.2 Functionality:

- The user can view laboratory results on the Envoy in a form of a chart table, arranged by date and time of the samples.
- Each unit has access to a number of pre-prepared Laboratory charts, by selection of the chart label
- It is also possible to view all the results of a single Test (sample) in a list form

6.3 Envoy and Server Setup

Implement the following actions have to be taken before using the Envoy – Laboratory interface:

- **On the Envoy bedside monitors:**

Define a unique unit name for each of the wards that use the Envoy monitor(s)

- **On each Envoy monitor**,

Enter the Unit name and Device name via **System Setup** >> **Network Setup**

- On the Server

Prepare the following three lists: Units, Charts, and Lab Parameters

- **Units**
  1. Open the Chart Explorer panel
  2. Select the “Unit” symbol
  3. To insert a new unit press “New” or “File” >> New
  4. In the unit name area write the unit name
- **Charts**
  1. Open the Chart Explorer panel
  2. Select the “Chart” symbol
  3. To insert a new unit press “New” or “File” >> New
  4. In the chart name area write the chart name
  5. To insert parameters into a chart press “Insert”
  6. An alphabetic list of all parameters will appear
  7. Select up to 15 parameters to be included in the chart
  8. Press OK
  9. To arrange the parameter sequence, select a parameter.
  10. Use the up / down arrows to promote or denote the parameter to the required location.
- **Lab Parameters**
  1. Open the Chart Explorer panel
  2. Select the “Parameter” symbol
  3. A full list of the Laboratory parameters will appear
  4. Receive the full list of useful parameters from your laboratory computer manager.
  5. Note that new parameters enter automatically into the table as they are received from the laboratory computer
- **Attaching Charts to each unit**
  1. Open the Chart Explorer panel
  2. Select the “Unit” symbol
  3. To insert Chart into a Unit press “Insert”
  4. An list of all charts will appear
  5. Select the Charts to be available for the selected Unit

6. Press OK
7. To arrange the Chart sequence, select a Chart name
8. Use the up/down arrows to promote or denote the Chart name to the required location

Chapter 7

Maintenance

This chapter includes the following sections:

- Cleaning the ***Envoy*** bedside monitor
- Preventive maintenance and schedule
- MPU test procedures and servicing
- Module rack functional tests
- Final test of the ***Envoy*** bedside monitor

7.1 Cleaning the Envoy Bedside Monitor

The ***Envoy*** bedside monitor can be cleaned with most common hospital cleaning solutions and detergents. Be careful not to use caustic detergents or ammonia or acetone-based cleaning solutions. These may damage the bedside monitor.

➢ ***To clean the Envoy bedside monitor and accessories:***

1. Switch the monitor off and disconnect from the power supply before cleaning.
2. Dust the monitor regularly. Clean with a lint-free cloth or sponge dampened with cleaning solution. Abrasive scouring powders and pads should be avoided to prevent damage to the monitor.
3. Clean the display screen with non-abrasive, anti-static glass cleaners. Use a lint-free cloth. A paper towel may damage the screen.
4. Clean patient cables and all exposed surfaces with mild soap solution only. Using alcohol or any type of concentrated cleaning solution may impair patient cable flexibility.
5. Remove any adhesive used to attach the cable to the patient. To remove adhesive residue, use a plaster remover solution made up of one-third alcohol, two-thirds water, or use a commercial tape remover such as Scholl Double Seal tape remover. Do not use strong solvents (acetone, straight alcohol, ammonia, etc.). These will damage the cable.
6. Do not autoclave patient leads, transducer components or other sensors. Autoclaving permanently damages these instruments. If you need to sterilize accessories, we recommend Et0 gas sterilization.

7.2 Preventive Maintenance and Schedule

Mennen Medical Ltd. recommends checking periodically the ***Envoy*** by qualified Mennen Medical personnel for proper operation and calibration of the system as follows:

- Periodic check - twice a year
- Overall maintenance - once a year

7.2.1 Periodic Check - Twice a Year

Twice a year perform the following:

1. Check that the MPU Power LED is lit.
2. Check the state of the MPU fan and its noise level.
3. Check all the LED's of the input modules.
4. Check the exterior of the unit for any signs of damage or abuse. Units or parts, which show any signs of damage, should be immediately referred to a qualified technician.
5. Check for any mechanical damage
6. Check all external leads, plug-ins and accessories.
7. Check all functions of the instrument needed to monitor the patient and ensure that the instrument is in good working order and calibrated. If needed, calibrate the Envoy system using appropriate simulators.
8. Check the synchronization of the monitor and defibrillator as often as required by the Hospital Procedures Policy, and test it at least every three months.
9. Test the grounding and equipotential resistance of the monitor and power cables at least every three months.

Do not use the Envoy for any monitoring procedure on a patient if you identify features, which demonstrate impaired functioning on the instrument. Contact the hospital biomedical engineer, or Mennen Medical service engineer.

7.2.2 Overall Maintenance - Once a Year

Once a year, qualified service personnel must perform overall maintenance. If your service personnel are not yet qualified, contact your local Mennen Medical agent to get information about service contracts.

Once a year and after every repair, perform the following:

1. See Section 6.2.1 on page 6-3. Open the MPU and check that both fans (power supply's fan and the Pentium's fan) are operating properly. Replace the fans if needed.

2. Clean the interior of the MPU and especially the ventilation entrance from dust using a vacuum cleaner.

3. Close the MPU and check the display screen for proper operation.

4. Perform full performance checks of the monitor and all the vital sign modules, including safety checks. Check the pumps of the NIBP and $EtCO_2$ modules for mechanical noise.

5. Check the mechanical connections to the wall and the shelves. If any damage appears, contact the maintenance personnel of the hospital.

Warning: *Mennen Medical will not be responsible for the stability of the wall mounts and shelves unless checked by Mennen Medical at least once a year.*

Note: *Mennen Medical will perform the required check during the warranty period.*

At the end of the warranty period it is the responsibility of the hospital to provide a service call to Mennen medical service department, or to have a service contract.

6. Check for any leakage from the ***Envoy*** system according to the hospital standards.

7. Check proper operation of the six slots of the module rack with ECG module and BP module.

8. At the end, fill the form used in your hospital and sign it.

7.3 MPU Test Procedures and Servicing

This section lists the ***Envoy*** components serviceable by the field technician, and describes service procedures for repair and/or replacement.

For a complete listing of ***Envoy*** components, see Chapter 7, "Parts List and Recommended Spare Parts". For components not mentioned in this chapter, contact your Mennen Medical supplier for repair/replacement information.

Warning! Any attempt to repair components, which are not described in this chapter, or without following the repair procedures, can damage the unit and invalidate your warranty.

The following Main Processing Unit components are serviceable:

- Power supply unit – you can test, adjust and replace the power supply unit (See section 7.3.2 on page 7- 8).
- Hard Disk containing ***Envoy*** Software – you must replace the hard disk in cases of ***Envoy*** software upgrades, hard disk failure or corruption of ***Envoy*** software files (See section 7.3.3 on page 7-17).
- PC 104 COMM Board (See section 7.3.4 on page 7-19).
- SoundBlaster Board Cable and Speaker (See section 7.3.5 on page 7-20).
- Video/Isolation LAN Board (See section 7.3.6 on page 7-21).

Warning! Electrical shock hazard! Disconnect the main A/C power supply cable from the A/C power source before removing the MPU cover or disassembling any of the above components. If power must remain connected for troubleshooting while the unit is uncovered, use extreme caution. When you have completed a test, immediately unplug the unit. Do not wear rings, bracelets or metal objects that may come in contact with live power contacts.

Note: Do not connect the external keyboard to the MPU while the monitor is on and connected to a patient, as this may cause the monitor to reset.

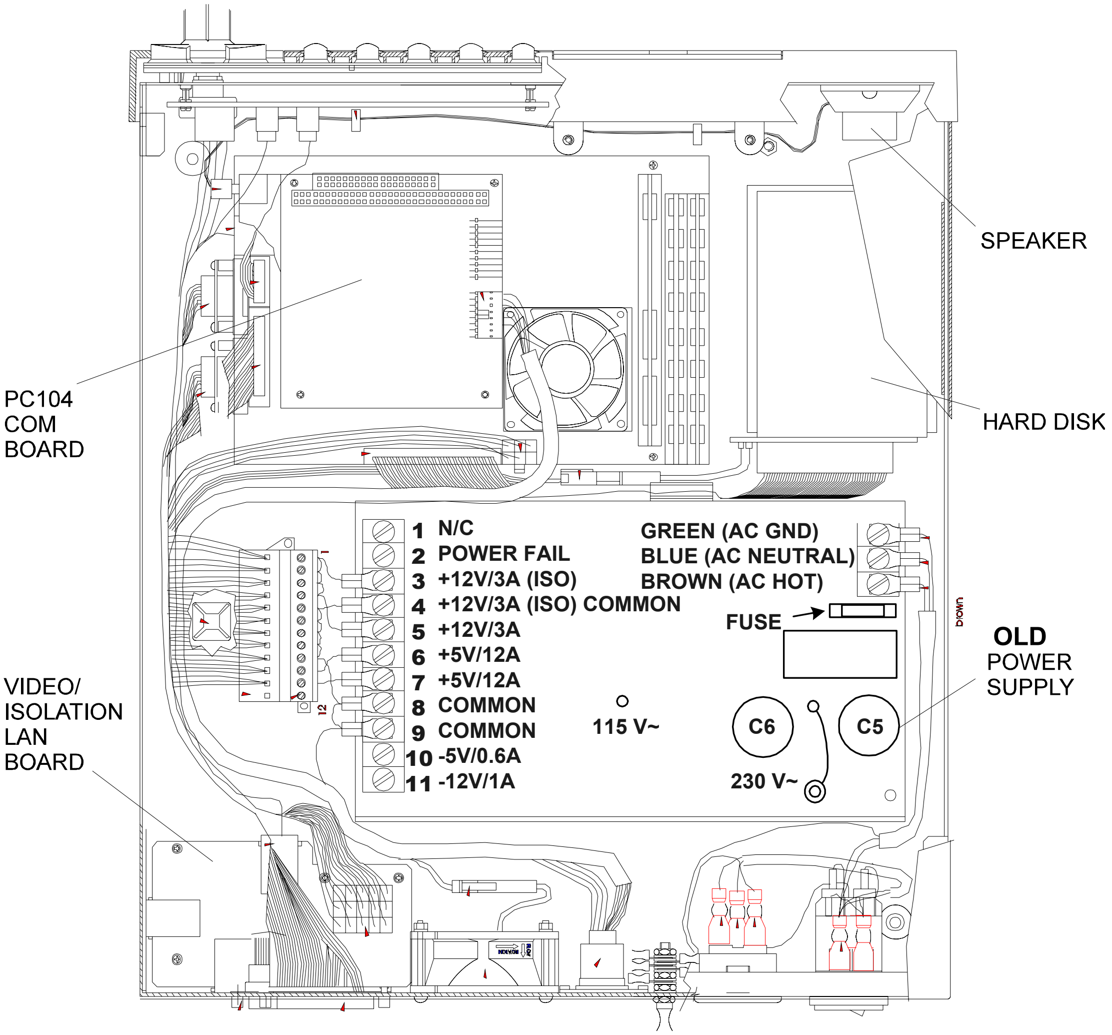

SPEAKER
PC104
COM
BOARD
HARD DISK
1 N/C
2 POWER FAIL
3 +12V/3A (ISO)
4 +12V/3A (ISO) COMMON
5 +12V/3A
6 +5V/12A
7 +5V/12A
8 COMMON
9 COMMON
10 -5V/0.6A
11 -12V/1A
GREEN (AC GND)
BLUE (AC NEUTRAL)
BROWN (AC HOT)
FUSE
OLD
POWER
SUPPLY
115 V~
C6
C5
230 V~
12
VIDEO/
ISOLATION
LAN
BOARD

Figure 7-1a. Main Processing Unit Serviceable Components, with Old Power Supply

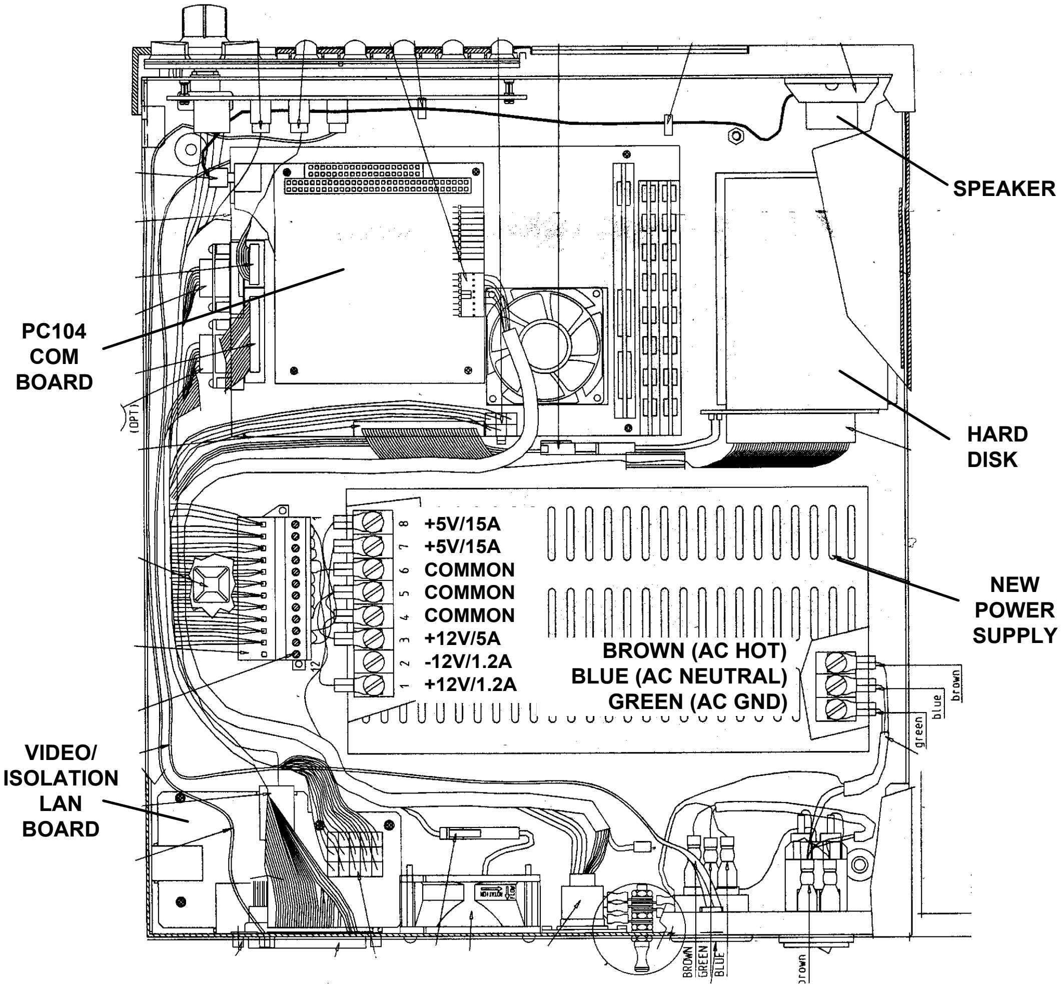

SPEAKER
PC104
COM
BOARD
HARD
DISK
+5V/15A
+5V/15A
COMMON
COMMON
COMMON
+12V/5A
-12V/1.2A
+12V/1.2A
NEW
POWER
SUPPLY
BROWN (AC HOT)
BLUE (AC NEUTRAL)
GREEN (AC GND)
VIDEO/
ISOLATION
LAN
BOARD
brown
blue
green
BROWN
GREEN
BLUE

Figure 7-1b. Main Processing Unit Serviceable Components, with New Power Supply

7.3.1 Removing MPU Cover

Before beginning any repair, you must remove the MPU cover.

➢ ***To remove the MPU cover:***

1. Remove the two Phillips screws located at both sides of the back panel (Figure 7-2).
2. Carefully pull the cover toward the back of the unit and lift it slightly upward.
3. Place the cover where it won’t be damaged or damage other equipment.

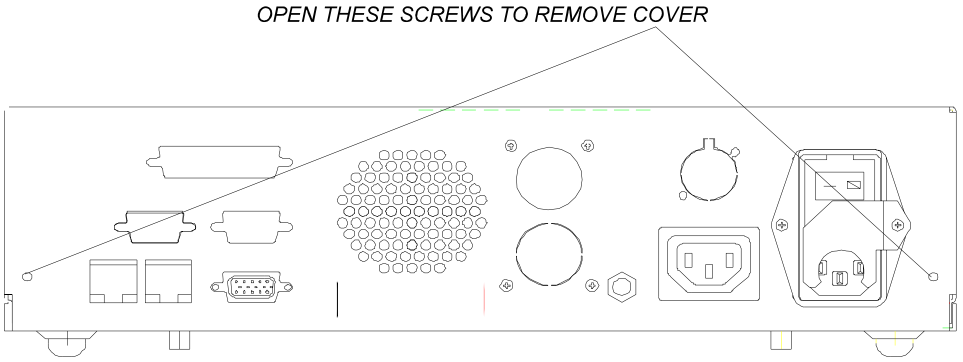


Figure 7-2. Removing the Computer Cover

When reinstalling the cover, make sure it is properly inserted into the case.

7.3.2 Testing, Adjusting or Replacing the Power Supply Unit

If the ***Envoy*** does not receive power when plugged into a live power outlet and turned ON, the Power Supply unit may be faulty. Before replacing the Power Supply unit, perform the following procedures:

- Inspect the power cable
- Check the fuses
- Check continuity between main power switch and power supply unit
- Test the power supply DC output

Inspecting the power cable

➢ ***To inspect the power cable:***

1. Disconnect the power cable from the wall outlet.
2. Visually inspect the power cable for damage.
3. Remove the power cable from the computer unit.
4. Use a small Phillips screwdriver to remove screw holding the cable retainer (Figure 7-3).
5. Disconnect the cable from the main power switch.
6. Flex the A/C power cable and test for any intermittent breaks.
7. If the power cable appears to be damaged, replace it with an equivalent cable.

Checking the fuses

➢ ***To check the fuses:***

1. Use a small flat blade screwdriver to carefully pry open the cover of the fuse compartment (Figure 7-3).

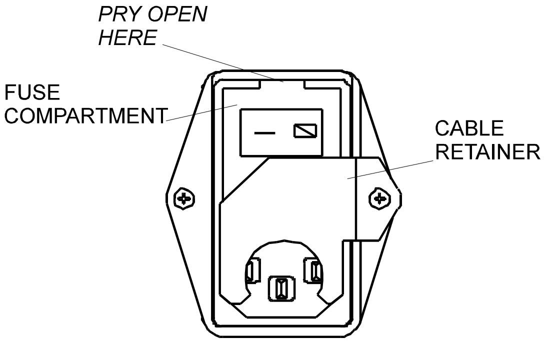


Figure 7-3. Main Power Switch with Cable Retainer and Fuse Compartment

2. Remove the two fuse trays and inspect the fuses.

3. If a fuse is burnt, replace with 3.15 A 250 V Slow Blow fuse for 115 VAC (USA) operation, or 2.0 A 250V Slow Blow fuse for 230 VAC (Europe) operation.

4. Return fuses to fuse trays and insert the fuse trays in their slots. Note the alignment arrows on the fuse trays. Close the fuse compartment cover securely.

Checking continuity between main power switch and power supply unit

➢ ***To check continuity between main power switch and power supply unit:***

1. Disconnect the main power cable from the wall outlet and the MPU.
2. With the main power cable removed, set power switch to ON.
3. Use an ohmmeter or continuity checker to check continuity between the left contact post and terminal A (Blue), and between the right contact post and terminal B (Brown) (Figure 7-4a or 7-4b, below).

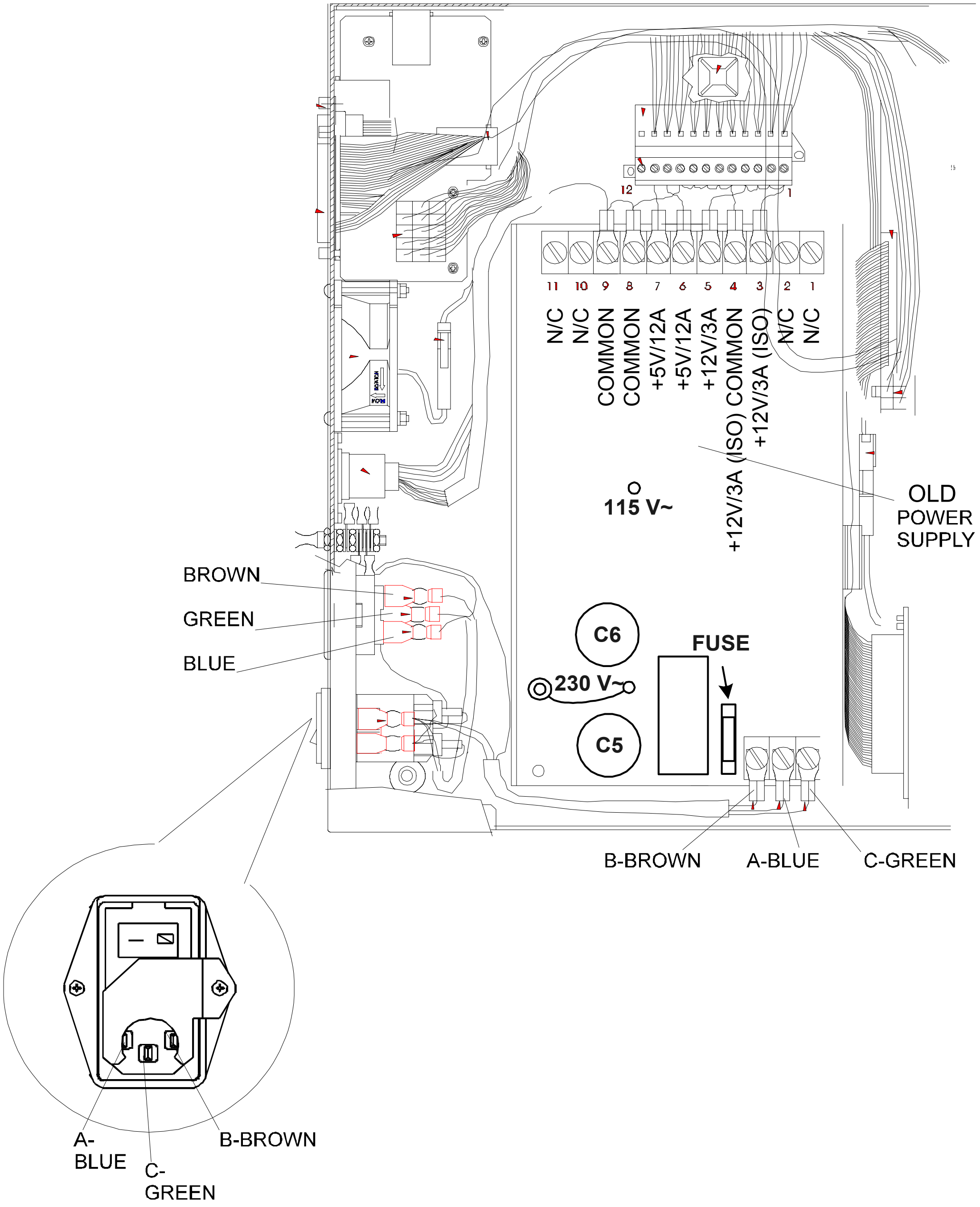

12
1
11
10
9
8
7
6
5
4
3
2
1
N/C
N/C
COMMON
COMMON
+5V/12A
+5V/12A
+12V/3A
+12V/3A (ISO) COMMON
+12V/3A (ISO)
N/C
N/C
115 V~
OLD
POWER
SUPPLY
BROWN
GREEN
BLUE
C6
FUSE
230 V~
C5
B-BROWN
A-BLUE
C-GREEN
A-
BLUE
C-
GREEN
B-BROWN

Figure 7-4a. Continuity Between Main Power Switch Contact Posts and Old Power Supply A/C input terminals

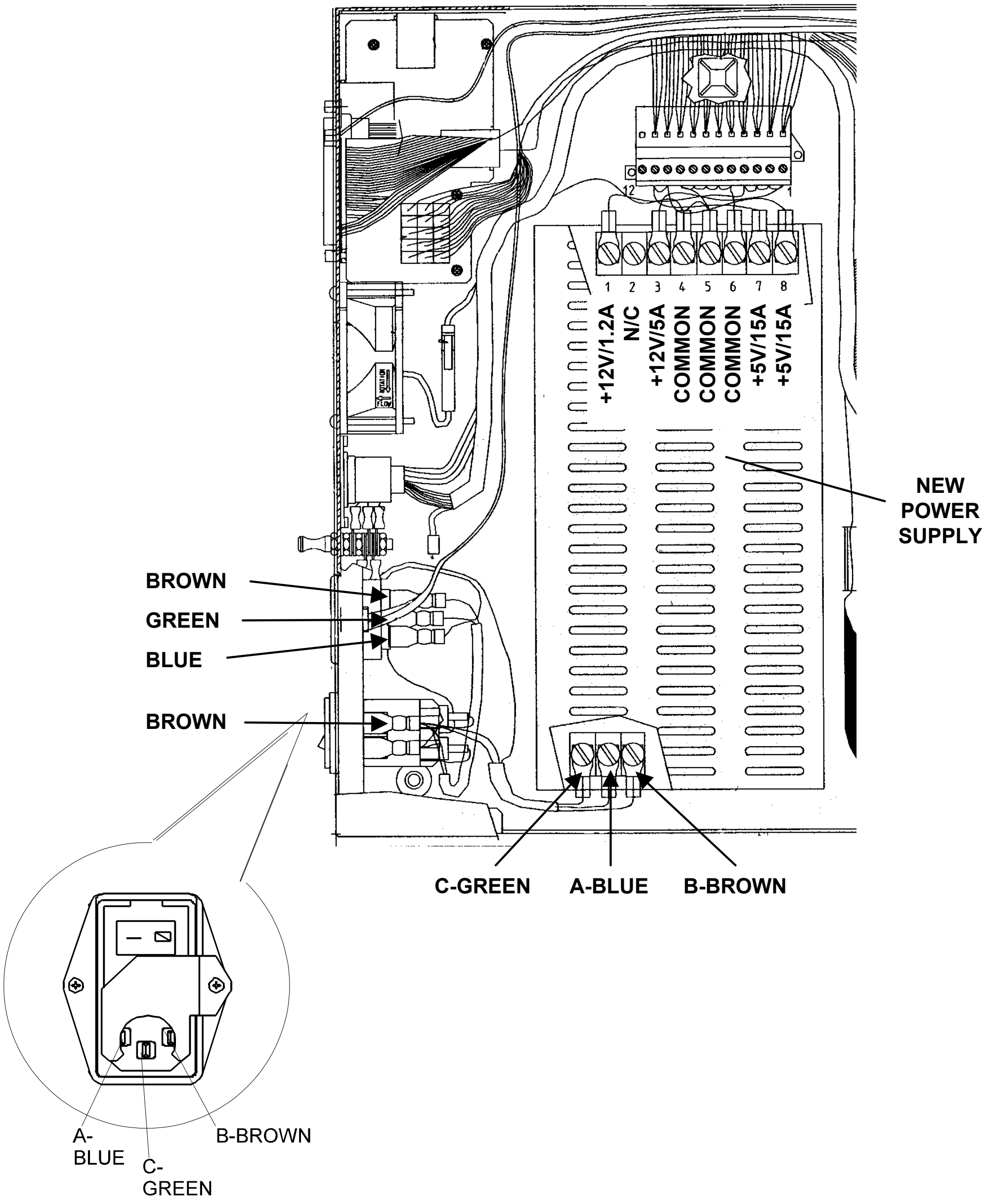

12
1
1 2 3 4 5 6 7 8
+12V/1.2A
N/C
+12V/5A
COMMON
COMMON
COMMON
+5V/15A
+5V/15A
NEW POWER SUPPLY
BROWN
GREEN
BLUE
BROWN
C-GREEN
A-BLUE
B-BROWN
A-BLUE
C-GREEN
B-BROWN

Figure 7-4b. Continuity Between Main Power Switch Contact Posts and New Power Supply A/C input terminals

4. If continuity between the power switch and the power supply is OK, proceed to the power supply output test.
5. If no continuity is found:

   Visually inspect the leads to the power supply unit, and check for continuity between the power switch and power supply (A to A and B to B,) (Figure 7-4a or 7-4b).

If the leads are damaged replace with P/N 554-303-015 “Cable-Inlet to power supply” (See Figure 7-4a or 7-4b for color coding).

If the leads are not damaged, check the main switch for continuity between the left post and the brown terminal, and between the right post and the blue terminal (Figure 7-4a or 7-4b).

6. If main power switch assembly is damaged replace with P/N 554-206-030 [A/C Input Module Assembly]:

Disconnect the main power cable from the wall outlet.

Remove the two Phillips screws at either side of the power switch assembly (Figure 7-4a or 7-4b).

Remove terminal leads from the old Main power switch assembly .

Carefully push the power switch assembly inward to remove it.

Carefully insert the new power switch assembly.

Connect the colored leads as shown in Figure 7-4a or 7-4b.

Replace the two Phillips screws at either side of power switch assembly, together with the cable retainer.

Important: *The yellow/green ground lead must be properly connected (Figure 7-4a or 7-4b).*

Testing the Power Supply DC output

➢ ***To check the power supply fuse:***

1. Disconnect the main power cable form the wall outlet.
2. Remove the computer cover.
3. Check the on-board power fuse located next to the power supply input terminals (Figure 7-4a). On the new power supplies, the slotted cover must first be removed; the fuse is near the AC input terminal block.
4. If fuse is burnt, replace with the recommended fuse..
5. If fuse is not burnt, continue with power supply DC output test.

➢ ***To test DC output:***

1. Connect the main power cable to the wall outlet.
2. Make sure main power switch is turned ON.

3. Use a DC voltmeter to check the following voltages. Refer to Figure 7-4a and Figure 7-4b for location and numbering for DC output terminal blocks. Voltages are measured relative to a COMMON.

Terminal Block No.	Old power Supply Voltage	New power Supply Voltage
1	N/C	+12V ±3%
2	N/C	N/C
3	+12V (ISO) ±3%	+12V ±3%
4	+12V (ISO) COMMON	COMMON
5	+12V ±3%	COMMON
6	+5V ±0.5%	COMMON
7	+5V ±0.5%	+5V ±2%
8	COMMON	+5V ±2%
9	COMMON	---
10	N/C	---
11	N/C	---

4. If necessary, use potentiometer R101 to adjust the 5V output between terminals 6 (+5V), and 8 (COMMON) on the Old Power Supply. (see Figure 7-4a).

5. If you find the power output is not within the above ranges, replace the Old Power Supply Unit with P/N 108-020-033. The New Power Supply Unit should be replaced with P/N 108-020-034.

Removing and replacing the Power Supply Unit

If the ***Envoy*** still does not receive power after performing the above procedures, remove the faulty unit and install a replacement power supply unit (Mennen ***Envoy*** part # 108-020-033 for Old Power Supply, part # 108-020-034 for New Power Supply) with/without a new DC distribution terminal block.

➢ ***To remove the power supply unit:***

1. Disconnect the main power cable from the wall outlet.
2. Remove the computer cover.
3. Remove the three Phillips screws and power inlet leads at terminals A, B and C (Figure 7-4a or 7-4b).

If you are not replacing the DC distribution terminal block, remove all leads connecting the DC supply terminal block to the DC distribution terminal block, and continue with the procedure for removing the power supply below.

If you **are** replacing the DC distribution terminal block, remove the following:

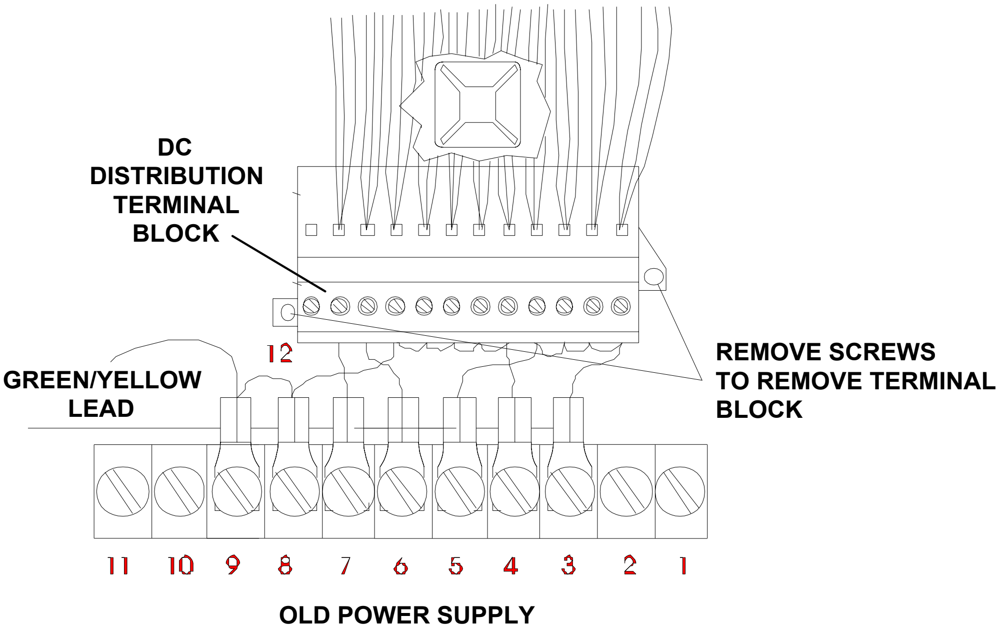

DC
DISTRIBUTION
TERMINAL
BLOCK
GREEN/YELLOW
LEAD
12
REMOVE SCREWS
TO REMOVE TERMINAL
BLOCK
11
10
9
8
7
6
5
4
3
2
1
OLD POWER SUPPLY

Figure 7-5a. DC Distribution Terminal Block – Old Power Supply

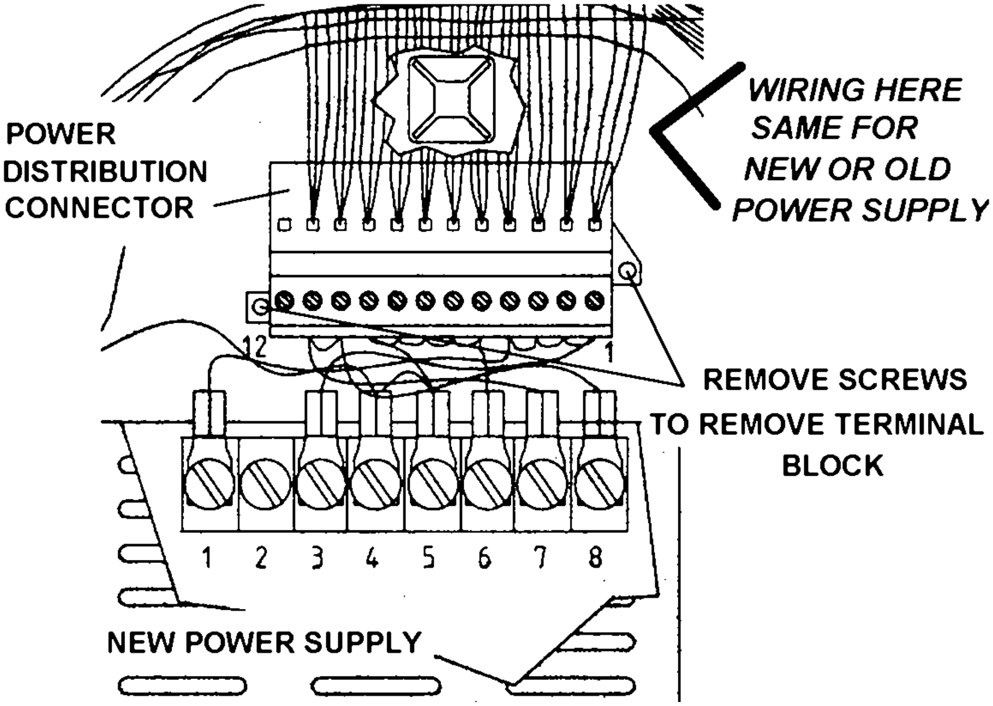

POWER
DISTRIBUTION
CONNECTOR
WIRING HERE
SAME FOR
NEW OR OLD
POWER SUPPLY
12
1
REMOVE SCREWS
TO REMOVE TERMINAL
BLOCK
1
2
3
4
5
6
7
8
NEW POWER SUPPLY

Figure 7-5b. DC Distribution Terminal Block – New Power Supply

The power connector, which contains wiring to system. (Figure 7-5a or 7-5b).

The DC distribution terminal block (Figure 7-5a or 7-5b).

The yellow/green ground lead. (Figure 7-5a or 7-5b)

The two fastening screws at the base of the DC distribution terminal block (Figure 7-5a or 7-5b).

4. Turn unit on one side, locate and carefully remove the four Phillips screws (opposite the four corners of the power supply), holding the power supply to the base of MPU.
5. Carefully remove the power supply unit (and the DC distribution terminal block if you are also replacing it).
6. Replace power supply unit with Mennen ***Envoy*** part # 108-020-033 for the Old Power Supply, or part # 108-020-034 for the New Power Supply.

Make sure that the voltage switching lead is connected to the pin appropriate to your local voltage (110 or 230VAC) on the Old Power Supply. The voltage switching lead and pins are located near condensers C5 and C6 (Figure 7-6). The New Power Supply does not need a jumper change; it has an automatic 85 ~ 264VAC operating range.

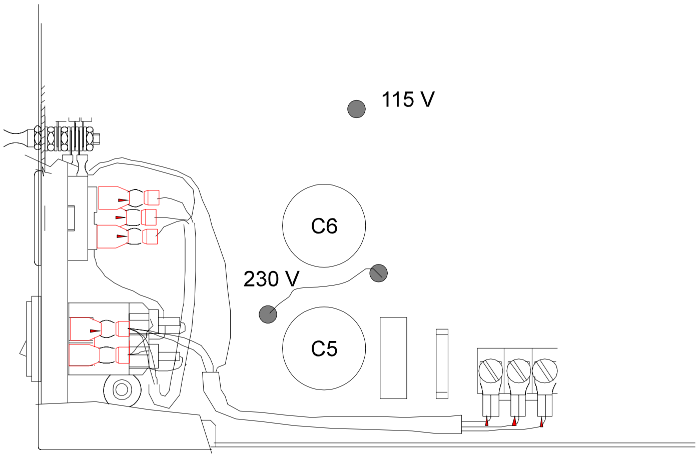


Figure 7-6. Setting the Voltage (220/115) on the Old Power Supply

➢ ***To install a replacement power supply unit with a new DC distribution terminal block:***

1. Lay the *Envoy* computer flat, and set the replacement power supply unit in its place.
2. Hold the power supply unit securely in place with one hand, and turn the ***Envoy*** computer on one side.
3. Align the screw holes and reinsert the four Phillips screws that hold the power supply unit in place.
4. Lay the ***Envoy*** computer flat again, and reconnect the three AC input leads (A, B, & C, Figure 7-4a or 7-4b)

5. Secure the DC distribution terminal block with the two screws in its base.
6. Plug the DC distribution connector into the DC distribution terminal block.
7. Reconnect the yellow/green ground lead as indicated in Figure 7-4a or 7-5b.
8. Connect the main power cable to the wall outlet.
9. Perform the Power Supply DC output test procedure described on page 12, and make adjustments if necessary.
10. Disconnect the main power cable from the wall outlet.
11. Replace the computer cover and tighten the two screws.

➢ ***To install a new power supply unit without a new DC distribution terminal block:***

1. Follow steps 1-4 in the above procedure.
2. After reinstalling the power supply unit, connect the appropriate leads to the power supply terminal block on the replacement power supply unit.
3. Continue with steps 8-10 in the above procedure.

7.3.3 Replacing the Hard Disk

Replace the hard disk in the following cases:

- ***Envoy*** software upgrade
- Hard disk failure
- Corruption of ***Envoy*** software files

Note: *After replacing the hard disk, ensure that BIOS parameters are in accordance with the hard disk. Change them if necessary.*

➢ ***To replace the hard disk:***

1. Disconnect the main power cable from the wall outlet.
2. Remove the computer cover.

Guard against static discharge damage to electronic components.

To ground yourself, do one or more of the following:

➢ *Wear an anti-static wrist band.*

➢ *Work on an anti-static mat.*

➢ *Ground yourself by touching the metal case of some grounded appliance. In high static environments—e.g., carpets or surrounding curtains—touching the case of the Envoy (if it is unplugged), may not completely remove a static charge.*

Carefully disconnect the IDE cable and power cable from the rear of the hard disk (Figure 7-7).

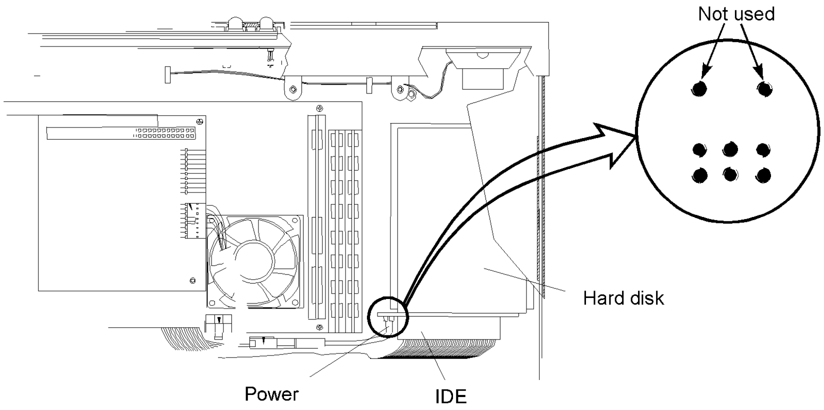


Figure 7-7. Hard Disk IDE and Power Connectors

Turn the unit on one side.

4. The hard disk is attached to a bracket which is secured by four Phillips screws through the base of the unit.

Locate these screws at the outside bottom of the case opposite the four corners of the hard disk bracket (Figure 7-8).

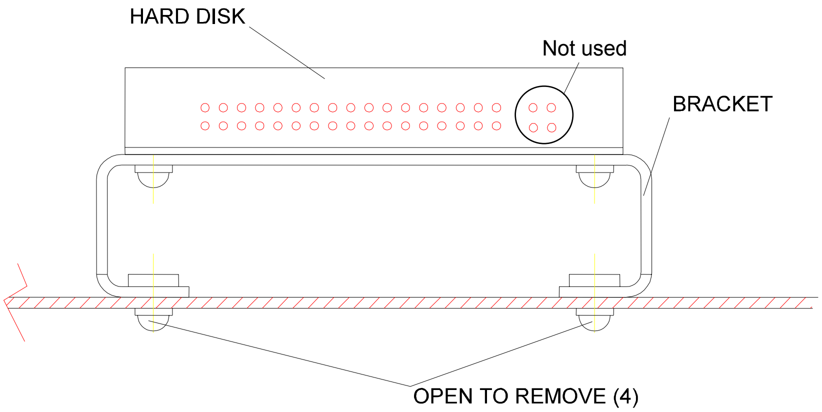


Figure 7-8. Hard Disk and bracket

5. Hold the hard disk in place with one hand and remove the mounting screws.

Warning! Do not remove the small screws that secure the hard disk cover in place. Opening the cover may permanently damage the hard disk.

6. Remove the old hard disk together with its bracket, and install the new hard disk and bracket in its place.
7. Reinsert and tighten the four bracket mounting screws, and lay the unit flat.
8. Carefully reconnect the IDE cable plug and DC power connector.
9. Make sure that all the connectors are firmly in place.
10. Test the new hard disk before closing the cover:

    Connect the main power cable power socket.

    Connect the video display monitor.

    Turn ON the unit main power switch.

11. If the unit boots up correctly, put the cover in place.
12. If the unit does not function properly, recheck the IDE cable plug and DC power connector.

7.3.4 Servicing the PC 104 COMM Board

Warning! Guard against static discharge damage to electronic components. To ground yourself, do one or more of the following:

- *Wear an anti-static wrist band*
- *Work on an anti-static mat*
- *Ground yourself by touching the metal case of some grounded appliance. In high static environments—e.g., carpets or surrounding curtains—touching the case of the Envoy (if it is unplugged), may not completely remove static charge*

➢ ***To replace the PC 104 COMM board:***

1. Disconnect the main power cable.
2. Remove the computer cover.
3. Disconnect all cables form the board.
4. Remove the four Phillips mounting screws.
5. Mount the new PC 104 COMM Board, secure with the screws and reconnect the cables.
6. Reinstall the cover.

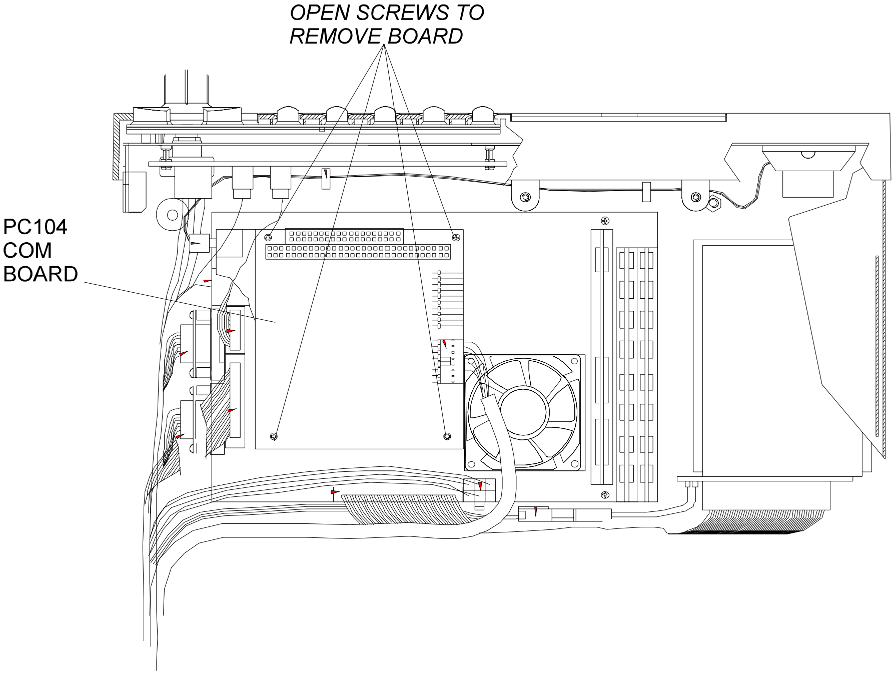


Figure 7-9. Replacing the PC 104 COMM Board

7.3.5 Replacing the Sound Board Cable, and Speaker

The SoundBlaster speaker and cable are replaced as a single unit (Mennen ***Envoy*** part # 554-304-016 “Cable Assembly Internal, — Cable speaker to SoundBlaster”).

➢ ***To replace the SoundBlaster speaker and cable:***

1. Disconnect the main power cable.
2. Remove the cover.
3. Remove the ***Envoy*** Hard disk with its mounting bracket.
4. Disconnect the SoundBlaster connector (Figure 7-10).

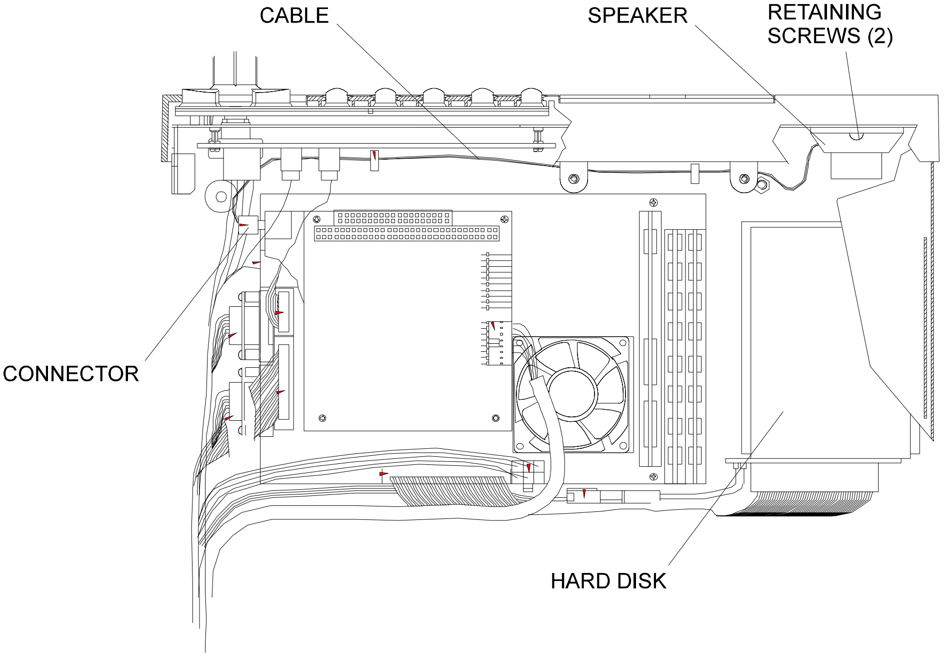


Figure 7-10. Sound Board, Speaker and Cable

5. Remove the two Phillips screws (top and bottom) securing the SoundBlaster speaker to the ***Envoy*** front panel.
6. Mount new speaker unit and replace the screws.
7. Reconnect the cable.
8. Remount the hard disk and bracket.
9. Reinstall the cover.

7.3.6 Servicing the Video/Isolation LAN Board

Warning! Guard against static discharge damage to electronic components. To ground yourself, do one or more of the following:

- *Wear an anti-static wrist band*
- *Work on an anti-static mat*
- *Ground yourself by touching the metal case of some grounded appliance. In high static environments—e.g., carpets or surrounding curtains—touching the case of the Envoy (if it is unplugged), may not completely remove static charge.*

Problems may occur with the Video or with the LAN cable or isolation board.

Video Problem

If no video signal reaches the ***Envoy*** video monitor, the problem may be due to:

- Faulty external cable
- Faulty internal CPU video board cable
- Faulty video board

To ensure that the video signal reaches the ***Envoy*** video monitor, perform the following:

- Check the external video signal cable for continuity.
- Check the internal CPU-video board cable by replacing it with a known working cable (Mennen ***Envoy*** MPU part #554-305-011 “Cable Assembly-CPU-VGA Video Output.”).

➢ ***To replace the CPU-video board cable:***

1. Cut the two tiewraps bundling the internal cables.
2. Disconnect the cable from the Video/Isolation LAN Board.
3. Open the two screws and disconnect the cable from the motherboard.
4. Replace the cable with Mennen ***Envoy*** Computer Unit part #554-305-011 “Cable Assembly-CPU-VGA Video Output.”
5. Bundle the cables and replace the tiewraps.

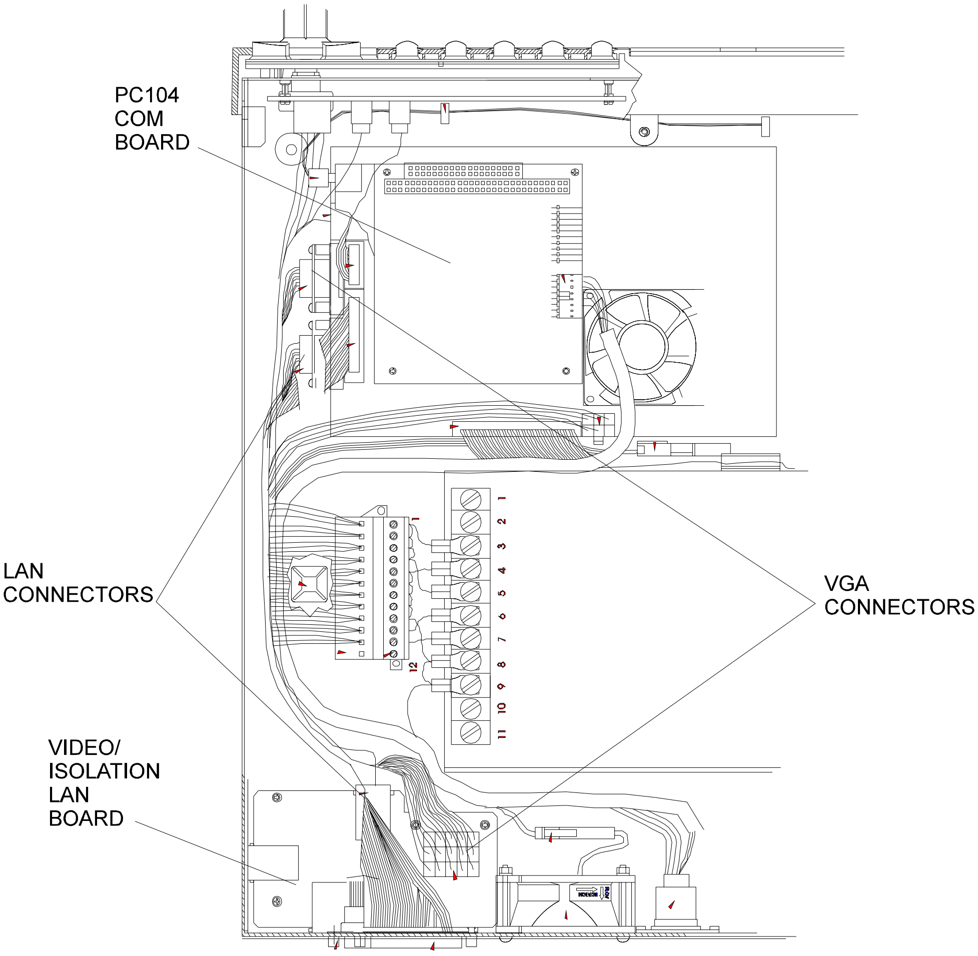

PC104
COM
BOARD
LAN
CONNECTORS
VGA
CONNECTORS
VIDEO/
ISOLATION
LAN
BOARD
1
2
3
4
5
6
7
8
9
10
11
12

Figure 7-11. LAN and VGA Connectors

6. If all video cables are working properly and there is still no video output signal, replace the Video/Isolation LAN Board.

LAN Problem

If no LAN signal reaches the ***Envoy*** Ensemble station and the network is known to be working properly, the problem may be due to:

- Faulty internal LAN cable
- Faulty LAN board

Check the internal LAN cable by replacing it with a known working cable (Mennen ***Envoy*** MPU part #554-304-014 “Cable Assembly-LAN thru Int.”). If the LAN throughput cable is working properly and there is still no throughput signal, replace the Video/Isolation LAN Board.

➢ ***To replace the internal LAN cable:***

1. Cut the two tiewraps bundling the internal cables.

2. Disconnect the internal LAN cable from the board.
3. Follow the LAN throughput cable to its terminal on the mother board, and disconnect the cable.
4. Replace the cable with Mennen ***Envoy*** MPU part #554-304-014 "Cable Assembly-LAN thru Int."
5. Bundle the cables and replace tiewraps.

➢ ***To remove the Video/Isolation LAN Board:***

1. Unplug the ***Envoy*** unit from the A/C power wall outlet.
2. Remove the computer cover.
3. Disconnect all the cables from the Video/Isolation LAN board.
4. Remove the four Phillips screws that secure the Video/Isolation LAN Board (See Figure 7-12).

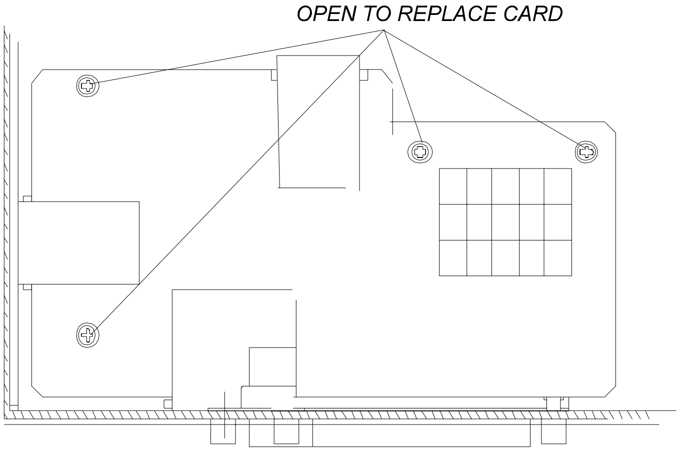


Figure 7-12. Video/Isolation LAN Board Mounting Screws

5. Tilt the inside edge of the Video/Isolation LAN Board slightly upward, and move the board away from the back of the case. Make sure the external video connector clears the rear of the unit and remove the board.

➢ ***To install a new Video/Isolation LAN Board:***
(P/N 554-202-000 "PCBA-Video/Isolation LAN Board II.")

1. Tilt the inside edge of the board slightly upward and carefully align the external video connector with the hole in the rear of the unit.
2. Align the mounting screw holes and reinsert the four screws.
3. Reconnect the video and LAN cables and bundle the cables with tiewraps.
4. Reinstall the cover.

7.3.7 MPU Functional Tests

This section provides a procedure to test the functionality of the MPU (P/N 554-000-000). It assumes that the person testing the unit has working knowledge of an IBM PC and the ***Envoy*** monitor.

The functional tests includes the following procedures:

- Visual Inspection
- Connections for test
- Fans test
- Internal power supply voltages test
- Bios setup
- MPU front panel test
- MPU final test
- Speaker test
- MPU To Nurse Station communication test

Required Equipment

- VGA Color Monitor with connection cables
- “Master” Module Rack, P/N 553-000-000
- “Master” ECG Module, P/N 551-101-000
- Cable external - MPU to MR, P/N 550-314-010
- Optional PC Keyboard
- DVM Fluke 77 or similar
- “Ensemble” Nurse Station
- Ethernet Hub, P/N 146-040-120 or equivalent
- ECG Simulator, model DNI DYNATECH NEVADA INC., or similar
- 5 Lead Patient Cable, P/N 551-306-017

7.3.7.1 Visual Inspection

1. Inspect the MPU under test for defects in workmanship (scratches, missing hardware and labels, etc.). Check and ensure all required paperwork is attached and signed.
2. Open the MPU cover and check the following:

   Position of 115/230V jumper on the Old Power Supply unit (item 5 in Figure 7-13a).

   CPU and its fan attachment (item 8).

Hard disk integrity with ***Envoy*** program Version label (item 14).

Memory integrity (item 15).

Cache integrity (item 16 in).

BIOS Flash integrity (item 17).

PCBA PC-104 connection (item 18).

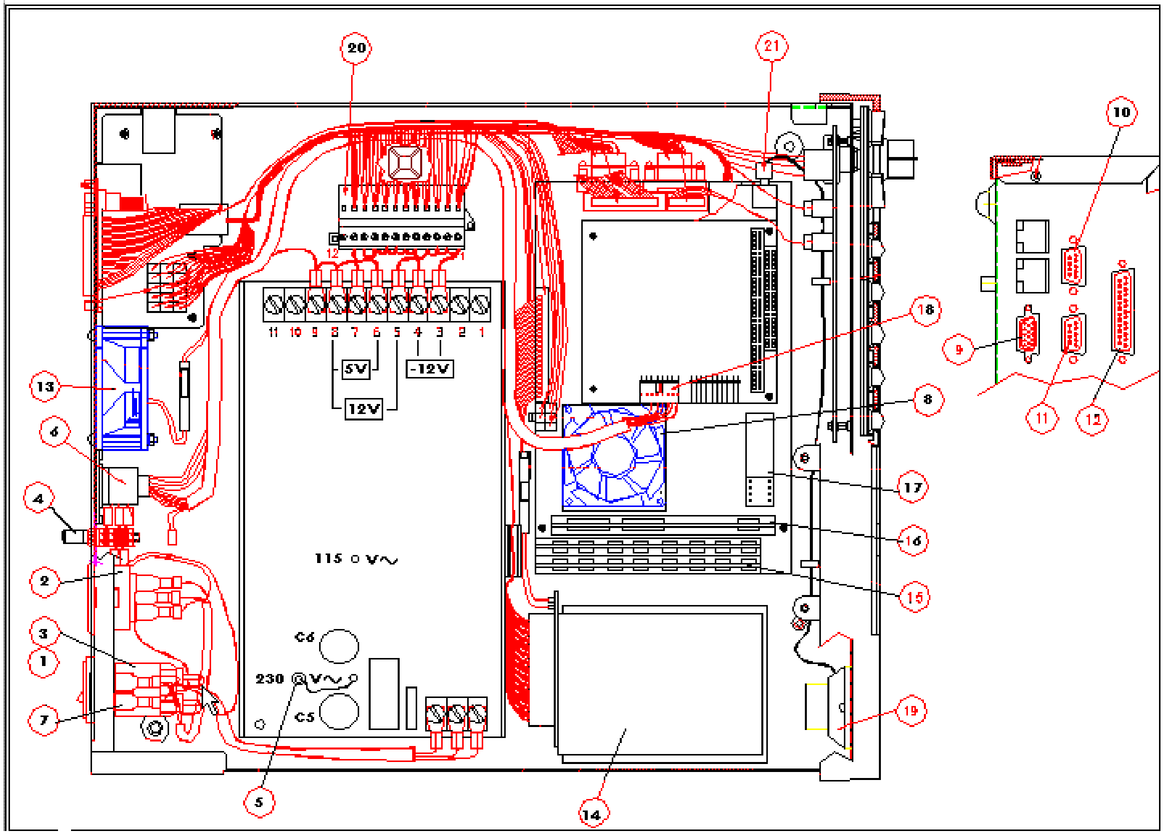

20
21
10
12
11 10 9 8 7 6 5 4 3 2 1
5V
-12V
12V
18
9
13
8
6
4
17
16
2
115 ○ V~
15
3
1
C6
230
C5
7
19
5
14
11
12

Figure 7-13a. MPU Components; Old Power Supply Installed

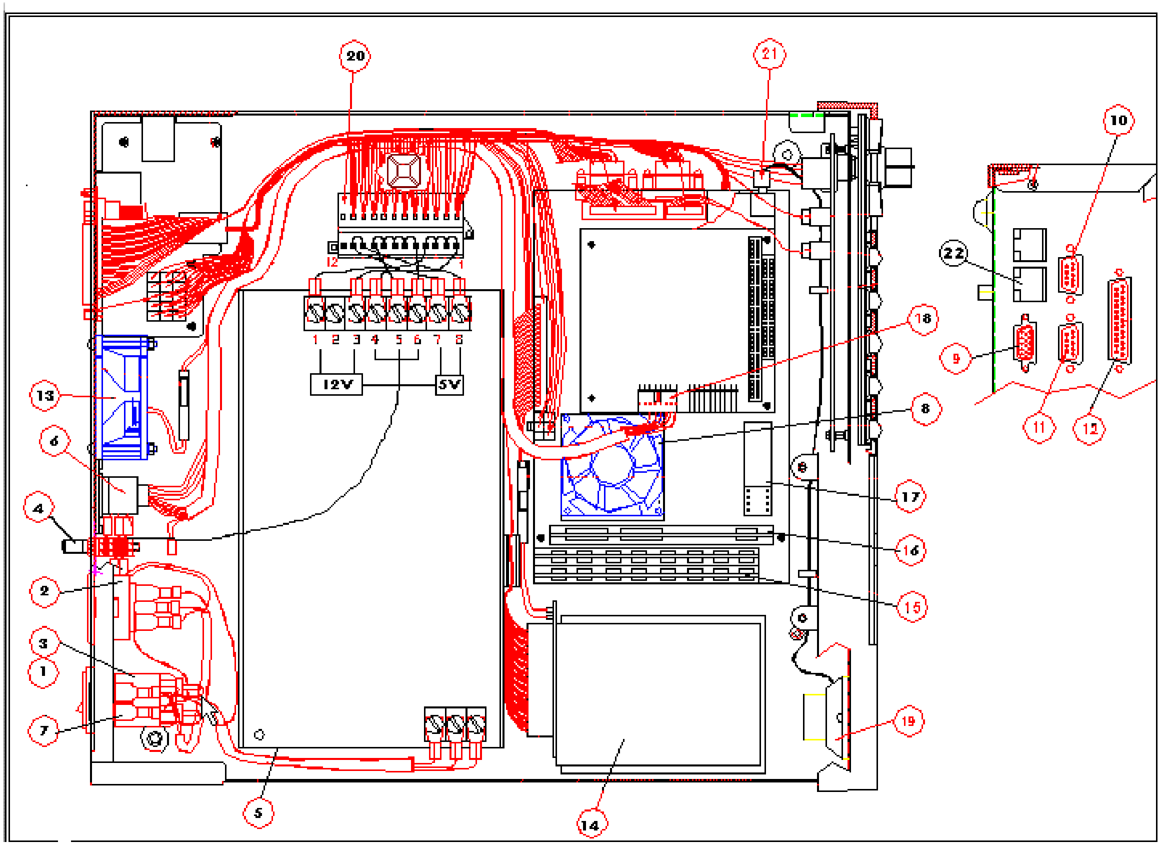

20
21
10
22
18
9
1 2 3 4 5 6 7 8
12V
5V
13
6
8
4
17
16
2
3
1
15
7
19
11
12
5
14

Figure 7-13b. MPU Components; New Power Supply Installed

7.3.7.2 Connections for Test

1. Connect the VGA color monitor to 15 pin connector (item 9 in Figure 7-13a or 7-13b).
2. Connect PC keyboard to MPU keyboard connector or to keyboard connector of the CPU card.

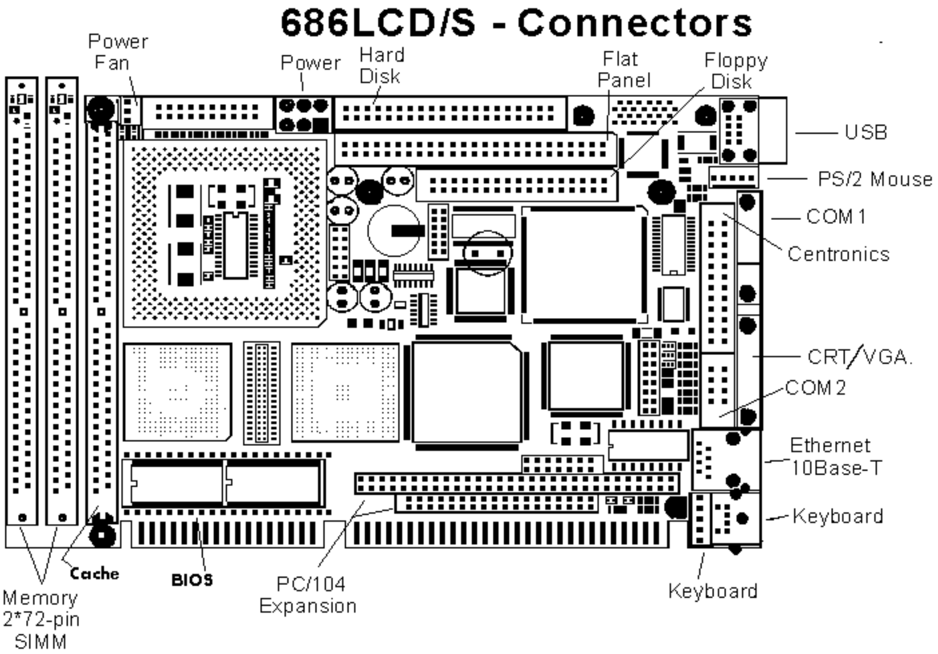

686LCD/S - Connectors
Power Fan
Power
Hard Disk
Flat Panel
Floppy Disk
USB
PS/2 Mouse
COM 1
Centronics
CRT/VGA.
COM 2
Ethernet 10Base-T
Keyboard
Keyboard
PC/104 Expansion
BIOS
Cache
Memory 2*72-pin SIMM

Figure 7-14. Connections for Test

7.3.7.3 Fans Test

Switch the MPU on, and verify that both CPU fan (on CPU card) and main fan (on the rear side of the MPU) are working (items 8 and 13 in Figure 7-13a or 7-13b).

***Note**: The MPU should immediately be switched off, if the fans are not rolled up.*

7.3.7.4 Internal Power Supply Voltages Test

1. With DVM, check voltages on Power Supply unit outputs. The voltage values must be as shown in the table below.
2. If necessary, adjust 5V output with potentiometer R101 V adj on supply unit (See Figure 7-13a).
3. Switch off the MPU.

Terminal Block No.	Old power Supply Voltage	New power Supply Voltage
1	N/C	+12V (11.7~12.9V)
2	N/C	N/C
3	+12V (ISO) (11.7~12.9V)	+12V (11.7~12.9V)
4	+12V (ISO) COMMON	COMMON
5	+12V (11.7~12.9V)	COMMON
6	+5V (4.8~5.2V)	COMMON
7	+5V (4.8~5.2V)	+5V (4.8~5.2V)
8	COMMON	+5V (4.8~5.2V)
9	COMMON	---
10	N/C	---
11	N/C	---

7.3.8 BIOS Setup

7.3.8.1 *ENVOY WITH "INSIDE" BOARD-BIOS V1.20 SETUP*

1. Switch On the UUT and enter the BIOS setup by pressing the **DEL** key of the PC Keyboard during boot up.
2. Enter BIOS with parameters according to the tables below.

BIOS SETUP	SETUP DETAILS	SETTINGS	SET TO	KEYS
Standard				**Enter**
	Pri Master			**Enter**
	Note: 1. Set Hard disk type to AUTO. 2. Press ENTER to automatic detect disk parameters. 3.Set Hard disk TYPE to USER and living disk parameter determined in Auto mode	Type	User	Enter, ↑↓, Esc
		LBA/Large Mode	Off <v2.4Z On >v3.0	
		Block Mode	On	
		32bit Mode	On	
		PIO Mode	4	
	Pri Slave			→, Enter,↑↓,Esc
		Type	Not Installed	
		LBA/Large Mode	N/A	
		Block Mode	N/A	
		32bit Mode	N/A	
		PIO Mode	N/A	
	Sec Master			→, Enter,↑↓,Esc
		Type	Not Installed	
		LBA/Large Mode	N/A	
		Block Mode	N/A	
		32bit Mode	N/A	

		PIO Mode	N/A	
	Sec Slave			→, Enter,↑↓,Esc
		Type	Not Installed	
		LBA/Large Mode	N/A	
		Block Mode	N/A	
		32bit Mode	N/A	
		PIO Mode	N/A	
	Date/Time			→, Enter
		DATE: TIME:	Current Date/Time	+ , - , Esc
	Floppy A		Not Installed	→, Enter,↑↓,Esc
	Floppy B		Not Installed	→, Enter,↑↓,Esc

BIOS SETUP	SETTINGS	SET TO	KEYS
Advanced			→, Enter,↑↓,Esc
	Quick boot	Enabled	Enter,↑↓,Esc
	1-st Boot Device	IDE-0	↓, Enter, ↑↓,Esc
	2-nd Boot Device	Disabled	↓, Enter, ↑↓,Esc
	3-rd Boot Device	Disabled	↓, Enter, ↑↓,Esc
	Try Other Boot Devices	No	↓, Enter, ↑↓,Esc
	PCMCIA ATA-HD Support	Disabled	↓, Enter, ↑↓,Esc
	Display Mode at Add-on	Force BIOS	↓, Enter, ↑↓,Esc
	Floppy Access Control	Read Write	↓, Enter, ↑↓,Esc
	Hard Disk Access Control	Read Write	↓, Enter, ↑↓,Esc
	S.M.A.R.T for Hard disk	Disabled	↓, Enter, ↑↓,Esc
	Boot-Up Num-lock	Off	↓, Enter, ↑↓,Esc
	Ps/2 mouse support	Disabled Enabled=for cs	↓, Enter, ↑↓,Esc
	Primary Display	VGA/EGA	↓, Enter, ↑↓,Esc
	Password check	Setup	↓, Enter, ↑↓,Esc

	Parity check	Disabled	↓, Enter, ↑↓,Esc
	Boot to OS/2	No	↓, Enter, ↑↓,Esc
	Wait for “F1” if error	Disabled	↓, Enter, ↑↓,Esc
	Internal Cache	Write Back	↓, Enter, ↑↓,Esc
	External Cache	Write Back	↓, Enter, ↑↓,Esc
	Cachebility obove 64MB	Disabled	
	C800,16K Shadow	Disabled	↓, Enter, ↑↓,Esc
	CC00,16K Shadow	Disabled	↓, Enter, ↑↓,Esc
	D000,16K Shadow	Disabled	↓, Enter, ↑↓,Esc
	D400,16K Shadow	Disabled	↓, Enter, ↑↓,Esc
	D800,16K Shadow	Disabled	↓, Enter, ↑↓,Esc
	DC00,16K Shadow	Disabled	↓, Enter, ↑↓,Esc
Chip Set			→, Enter,↑↓,Esc
	USB Function	Disabled	Enter, ↑↓,Esc
	USB Keyboard/Mouse Legacy Support	N/A	
	USB Passive Release Enable	N/A	
	Global Triton 2 Enable	Enabled	↓, Enter, ↑↓,Esc
	Memory Hole	Disabled	↓, Enter, ↑↓,Esc
	8bit I/O Recovery Time (Sysclk)	1	↓, Enter, ↑↓,Esc
	16bit I/O Recovery Time (Sysclk)	1	↓, Enter, ↑↓,Esc
	Dram timings	60ns	↓, Enter, ↑↓,Esc
	Refresh Rate	N/A	

BIOS SETUP	SETTINGS	SET TO	KEYS
Chip Set (CONT.)	Turbo Read Lead Off	N/A	
	Read Burst Timing	N/A	
	Write Burst Timing	N/A	
	Fast RAS to CAS Delay(Clocks)	N/A	
	Lead OFF timing	N/A	
	Turbo read pipeline	N/A	
	Speculative lead off	N/A	
	Turn-Around insertion	N/A	

	Memory Address Drive Strength	8ma/8ma	↓, Enter, ↑↓,Esc
	Type F DMA Buffer Control I 1	Disabled	↓, Enter, ↑↓,Esc
	Type F DMA Buffer Control I 2	Disabled	↓, Enter, ↑↓,Esc
	NA Disable (NAD)for EXT Cache	Enabled	↓, Enter, ↑↓,Esc
	Peer Concurrency	Enabled	↓, Enter, ↑↓,Esc
	Dram Data Integrity Mode	Disabled	↓, Enter, ↑↓,Esc
	PCI 2.1 Passive Release Enable	Enabled	↓, Enter, ↑↓,Esc
	Delayed Transaction Enable	Enabled	↓, Enter, ↑↓,Esc
	North Bridge Retry Enable	Enabled	↓, Enter, ↑↓,Esc
Power Mgmt			→, Enter,↑↓,Esc
	Power Management/APM	Disabled	↓, Enter, ↑↓,Esc
	Instant-On time-out(Minute)	N/A	
	Green PC Monitor Power State	N/A	
	Video Power Down Mode	N/A	
	Hard Disk Power Down Mode	N/A	
	Hard Disk Time Out (Minute)	N/A	
	Standby Time Out (Minute)	N/A	
	Suspend Time Out(Minute)	N/A	
	Slow clock ratio	N/A	
	Display Activity	N/A	
	IRQ3	N/A	
	IRQ4	N/A	
	IRQ5	N/A	
	IRQ7	N/A	

BIOS SETUP	SETTINGS	SET TO	KEYS
Power Mgmt (CONT.)	IRQ8	N/A	
	IRQ9	N/A	
	IRQ10	N/A	
	IRQ11	N/A	
	IRQ12	N/A	
	IRQ13	N/A	
	IRQ14	N/A	

	IRQ15	N/A	
PCI/PnP			→, Enter,↑↓,Esc
	Plug And Play Aware O/S	NO	↓, Enter, ↑↓,Esc
	PCI Latency Timer(PCI Clocks)	64	↓, Enter, ↑↓,Esc
	PCI VGA Palette Snoop	Disabled	↓, Enter, ↑↓,Esc
	PCI IDE BUS Master	Disabled	↓, Enter, ↑↓,Esc
	Off board PCI IDE CARD	Auto	↓, Enter, ↑↓,Esc
	Off board PCI IDE Primary IRQ	N/A	
	Off board PCI IDE Secondary IRQ	N/A	
	DMA Channel 0	Pnp	↓, Enter, ↑↓,Esc
	DMA Channel 1	Pnp	↓, Enter, ↑↓,Esc
	DMA Channel 3	Pnp	↓, Enter, ↑↓,Esc
	DMA Channel 5	Pnp	↓, Enter, ↑↓,Esc
	DMA Channel 6	Pnp	↓, Enter, ↑↓,Esc
	DMA Channel 7	Pnp	↓, Enter, ↑↓,Esc
	IRQ3	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ4	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ5	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ7	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ9	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ10	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ11	ISA/EISA	↓, Enter, ↑↓,Esc
	IRQ14	PCI/Pnp	↓, Enter, ↑↓,Esc
	IRQ15	PCI/Pnp	↓, Enter, ↑↓,Esc
	Reserved Memory Size	Disabled	↓, Enter, ↑↓,Esc
	Reserved Memory Adress	N/A	
Utilities			→, Enter,↑↓,Esc
V.120.XXXXX-XX	OUI 00E0F4XXXXXX FF0000000000000		
	Processor Clock (INT/EXT)	233/66 MHz	↓, Enter, ↑↓,Esc
	Secure CMOS	Activated (Disabled at first Boot)	↓, Enter, ↑↓,Esc
	Ethernet Controller	ON	↓, Enter, ↑↓,Esc

	SCSI Controller	Off	↓, Enter, ↑↓,Esc

BIOS SETUP	SETTINGS	SET TO	KEYS
Utilities (CONT.)	VGA Controller	ON	↓, Enter, ↑↓,Esc
	Display Type	CRT Only	↓, Enter, ↑↓,Esc
	Panel Drive	00h	↓, Enter, ↑↓,Esc
	Panel Interface	N/A	
	JPLCD PIN 5	N/A	
	Panel Link adjustment	N/A	
	SSD Drive	Off	↓, Enter, ↑↓,Esc
	SSD Prepare	Off	↓, Enter, ↑↓,Esc
	On board FDC	Disabled	↓, Enter, ↑↓,Esc
	On board Serial Port1	Auto	↓, Enter, ↑↓,Esc
	Serial Port 1 Interface	RS 232	↓, Enter, ↑↓,Esc
	Serial port 1 CND	N/A	
	On board Serial Port 2	Auto	↓, Enter, ↑↓,Esc
	Serial Port 2 Mode	Normal	↓, Enter, ↑↓,Esc
	IR Duplex Mode	N/A	
	Receiver Polarity	N/A	
	Transmitter Polarity	N/A	
	Fast IR Port	N/A	
	Fast IR DMA	N/A	
	On board Parallel Port	Disable	↓, Enter, ↑↓,Esc
	Parallel Port Mode	N/A	
	EPP Version	N/A	
	Parallel Port IRQ	N/A	
	Parallel Port DMA Channel	N/A	
	ONB Speaker	ON	↓, Enter, ↑↓,Esc
	General Purpose I0 0	Input	↓, Enter, ↑↓,Esc
	General Purpose I0 1	Input	↓, Enter, ↑↓,Esc
	General Purpose I0 2	Input	↓, Enter, ↑↓,Esc
	General Purpose I0 3	Input	↓, Enter, ↑↓,Esc
	General Purpose I0 4	Input	↓, Enter, ↑↓,Esc

	General Purpose I0 5	Input	↓, Enter, ↑↓,Esc
	General Purpose I0 6	Input	↓, Enter, ↑↓,Esc
	General Purpose I0 7	Input	↓, Enter, ↑↓,Esc
	Watch dog time-out action	None	↓, Enter, ↑↓,Esc
	Watch dog time-out period	0.2s	↓, Enter, ↑↓,Esc
	Inside Interrupt	Off	↓, Enter, ↑↓,Esc
	High temp. limit, Act: xxx °C	xxx	
	Temperature. violation action	Nothing	↓, Enter, ↑↓,Esc
	Fan overload lomit, act	xxx	
	Fan disconnect or overload action	Nothing	↓, Enter, ↑↓,Esc
	On board IDE	Primary	

7.3.8.2 *Envoy with Microbus MAT990 Board-BIOS (4.51.03) SETUP*

1. Switch On the UUT and enter the BIOS setup by pressing the **DEL** key of the PC Keyboard during boot up.
2. Enter BIOS with parameters according to the tables below.

SETTINGS	SET TO	KEYS
Standard CMOS SETUP		**Enter**
DATE (mm:dd:yy) TIME (hh:mm:ss)	Current Date/Time	+ , - , ↓
Hard Disk Type	TYPE: AUTO	+ , - , ↓
	M0DE: AUTO	
Primary Slave	None	+ , - , ↓
Drive A	None	+ , - , ↓
Drive B	None	+ , - , ↓
Video	EGA/VGA	+ , - , ↓
Observe Memory:		
Base Memory: 640K Extended Memory: 128MB for Envoy 256MB for Ensemble Other Memory: 384K		
Total Memory: 128 or 256		
		Esc, ↓

SETTINGS	SET TO	KEYS
BIOS FEATURES SETUP		Enter
CPU Internal Cache	Enabled	+ , - , ↓
External Cache	Enabled	+ , - , ↓
CPU L2 Cache ECC Checking	Disabled	+ , - , ↓
Quick Power On Self Test	Enabled	+ , - , ↓
Boot Sequence	C only	+ , - , ↓
Swap Floppy Drive	Disabled	+ , - , ↓
Boot Up Floppy Seek	Disabled	+ , - , ↓
Boot Up NumLock Status	Off	+ , - , ↓
Typematic Rate Setting	Disabled	+ , - , ↓
Typematic Rate (chars/sec)	30	+ , - , ↓
Typematic Delay (Msec)	250	+ , - , ↓
PS/2 Mouse Function Control	Enabled	+ , - , ↓
PCI/VGA Palette Snoop	Disabled	+ , - , ↓
Assign IRQ For VGA	Disabled	+ , - , ↓
OS Select For DRAM>64MB	Non –OS/2	+ , - , ↓
HDD S.M.A.R.T. capability	Disabled	+ , - , ↓
Report No FDD for WIN95	Yes	+ , - , ↓
Video BIOS Shadow	Enabled	+ , - , ↓
C8000-CBFFF Shadow	Enabled	+ , - , ↓
CC000-CFFFF Shadow	Enabled	+ , - , ↓
D0000-D3FFF Shadow	Enabled	+ , - , ↓
D4000-D7FFF Shadow	Enabled	+ , - , ↓
D8000-DBFFF Shadow	Enabled	+ , - , ↓
DC000-DFFFF Shadow	Disabled	+ , - , ↓

SETINGS	SET TO	KEYS
CHIPSET FEATURES SETUP		Enter
Dram Data Integrity Mode	Non-ECC	
System BIOS Cacheable	Enabled	+ , - , ↓
Video BIOS Cacheable	Enabled	
Video RAM Cacheable	Enabled	+ , - , ↓
8Bit I/O Recovery Time	Normal	+ , - , ↓
16Bit I/O Recovery Time	Normal	+ , - , ↓
Memory Hole At 15M-16M	Disabled	+ , - , ↓
Passive Release	Enabled	+ , - , ↓
Delayed Transaction	Enabled	+ , - , ↓
AGP Aperture Size (MB)	64	+ , - , ↓
CPU Warning Temperature	75 ºC/167ºC	
Current CPU Temperature	xxºC /xxxºC	

SETTINGS	SET TO	KEYS
POWER MANAGEMENT SETUP		Enter
Power Management	Disabled	+ , - , ↓
PM Control by APM	Disabled	+ , - , ↓
Video Off Method	Blank Screen	+ , - , ↓
Video Off After	Doze	+ , - , ↓
Doze Mode	Disable	+ , - , ↓
Standby Mode	Disable	+ , - , ↓
Suspend Mode	Disable	+ , - , ↓
HDD Power Down	Disable	+ , - , ↓
CPU throttled by	12.5%	+ , - , ↓
PCI/VGA Act-Monitor	Disabled	
Resume by Alarm	Disabled	+ , - , ↓
Date (of Month) Alarm	DD	
Time(hh:mm:ss)	HH:MM:SS	
IRQ 8 Break Suspend	Enabled	
IRQ[3-7, 9-15] NMI	Disabled	

SETTINGS	SET TO	KEYS
Primary IDE 0	Disabled	+ , - , ↓
Primary IDE 1	Disabled	+ , - , ↓
Secondary IDE 0	Disabled	+ , - , ↓
Secondary IDE 1	Disabled	+ , - , ↓
Floppy Disk	Disabled	
Serial Port	Disabled	
Parallel Port	Disabled	
Power-Supply Type	AT	
Instant off	Disabled	+ , - , ↓

SETTINGS	SET TO	KEYS
PNP/PCI CONFIGURATION		Enter
PNP OS Installed	No	+ , - , ↓
Resources Controlled BY	Manual	+ , - , ↓
Reset Configuration Data	Disabled	+ , - , ↓
IRQ3	PCI/ISA PnP	+ , - , ↓
IRQ4	PCI/ISA PnP	+ , - , ↓
IRQ5	PCI/ISA PnP	+ , - , ↓
IRQ7	PCI/ISA PnP	+ , - , ↓
IRQ9	PCI/ISA PnP	+ , - , ↓
IRQ10	PCI/ISA PnP	+ , - , ↓
IRQ11	Legacy ISA	+ , - , ↓
IRQ14	PCI/ISA PnP	+ , - , ↓
IRQ15	PCI/ISA PnP	+ , - , ↓
DMA Channel 0	PCI/ISA PnP	+ , - , ↓
DMA Channel 1	PCI/ISA PnP	+ , - , ↓
DMA Channel 3	PCI/ISA PnP	+ , - , ↓
DMA Channel 5	PCI/ISA PnP	+ , - , ↓
DMA Channel 6	PCI/ISA PnP	+ , - , ↓
DMA Channel 7	PCI/ISA PnP	+ , - , ↓
Used MEM base addr	N/A	+ , - , Esc, ↓

SETTINGS	SET TO	KEYS
INTEGRATED PERIPHERIALS		Enter
IDE HDD Black Mode	Enabled	+ , - , ↓
IDE 32-bit Transfer Mode	Enabled	+ , - , ↓
On-Chip Primary PCI IDE	Enabled	+ , - , ↓
IDE Master PIO	Auto	+ , - , ↓
IDE Slave PIO	Auto	+ , - , ↓
IDE Master UDMA	Auto	+ , - , ↓
IDE Slave UDMA	Auto	+ , - , ↓
On-Chip Secondary PCI IDE	Disabled	+ , - , ↓
USB Controller	Disabled	+ , - , ↓
USB Keyboard Support	Disabled	+ , - , ↓
Initial Display Device	PCI slot	+ , - , ↓
Onboard FDC Controller	Disabled	+ , - , ↓
Onboard Serial Port A	Auto	+ , - , ↓
Onboard Serial Port B/IR	Auto	+ , - , ↓
Serial Port B Mode	RS232	+ , - , ↓
Onboard Parallel Port	378	+ , - , ↓
Parallel Port IRQ	7	+ , - , ↓
Parallel Port Mode	ECP+EPP1.9	+ , - , ↓
ECP Mode Use DMA	0	+ , - , ↓

SETTINGS	SET TO	KEYS
SPECIAL FEATURES SETUP		
Speaker	Enabled	
Onboard PCI Ethernet Chip	Enabled	
Onboard Display Device	CRT	
Hard Disk LBA Algorithm	Microbus	
UPS Alarm	Disable	

Save and Exit.

7.3.8.3 Envoy with “TEKNOR” T830 Board-Bios V3.1 Setup

1. Switch On the UUT and enter the BIOS setup by pressing the **DEL** key of the PC Keyboard during boot up.
2. Enter BIOS with parameters according to the tables below.

SETTINGS	SET TO	KEYS
Standard CMOS SETUP		Enter
DATE (mm:dd:yy) TIME (hh:mm:ss)	Current Date/Time	+ , - , ↓
HARD DISKS		
Primary Master	TYPE: Auto	+ , - , ↓
	M0DE: Auto	
Primary Slave	None	+ , - , ↓
Secondary Master	None	+ , - , ↓
Secondary Slave	None	+ , - , ↓
Drive A	None	+ , - , ↓
Drive B	None	+ , - , ↓
Video	EGA/VGA	+ , - , ↓
CRT & LCD	CRT Only	+ , - , ↓
Halt On	All, But, Disk/Key	+ , -
Observe Memory:		
Base Memory: 640K Extended Memory: 130048K Other Memory: 384K Total Memory: 131072K		
		Esc, ↓

SETTINGS	SET TO	KEYS
BIOS FEATURES SETUP		Enter
Virus Warning	Disabled	+ , - , ↓
Quiet Post	Enabled	+ , - , ↓
Quick Power On Self Test	Enabled	+ , - , ↓
Full Screen LOGO Show	Disabled	+ , - , ↓
Boot From LAN First	Disabled	+ , - , ↓

SETTINGS	SET TO	KEYS
Raid Card Boot First	Disabled	+ , - , ↓
Boot Sequence	C only	+ , - , ↓
Boot WinCE First	Disabled	+ , - , ↓
WinCE display setting	320x200x256	+ , - , ↓
Swap Floppy Drive	Disabled	+ , - , ↓
Boot Up Floppy Seek	Disabled	+ , - , ↓
Drive A Boot Parmit	Disabled	+ , - , ↓
Floppy Disk Access Control	R/W	+ , - , ↓
Report No FDD For WIN 95	Yes	+ , - , ↓
Hard Disk Write Protect	Disabled	+ , - , ↓
HDD S.M.A.R.T. capability	Disabled	+ , - , ↓
Delay For HDD (Secs)	0	+ , - , ↓
OS Select DRAM > 64MB	Non-OS2	+ , - , ↓
Gate A20 Option	Fast	+ , - , ↓
Security Option	Setup	+ , - , ↓
Diskette Access For	All	+ , - , ↓
Boot Up NumLock Status	ON	+ , - , ↓
Typematic Rate Setting	Disabled	+ , - , ↓
Typematic Rate (Chars/S)	30	+ , - , ↓
Typematic Delay	250	+ , - , ↓
VT100 Setting		
Comport	1	+ , - , ↓
Speed	AUTO	+ , - , ↓
Parity	NONE	+ , - , ↓
Data	8	+ , - , ↓
Stop	1	+ , - , ↓

SETTINGS	SET TO	KEYS
CHIPSET FEATURES SETUP		Enter
CPU Internal Cache	Enabled	+ , - , ↓
External Cache	Enabled	+ , - , ↓

SETTINGS	SET TO	KEYS
CPU L2 Cache ECC Checking	Disabled	+ , - , ↓
SDRAM RAS – to – CAS Delay	2	+ , - , ↓
SDRAM RAS Precharge Time	2	+ , - , ↓
SDRAM CAS latency Time	2	+ , - , ↓
SDRAM Precharge Control	Disabled	+ , - , ↓
Dram Data Integrity Mode	Non-ECC	+ , - , ↓
Memory Hole At 15M-16M	Disabled	+ , - , ↓
Video BIOS Cacheable	Enabled	+ , - , ↓
Video RAM Cacheable	Enabled	+ , - , ↓
8Bit I/O Recovery Time	1	+ , - , ↓
16Bit I/O Recovery Time	1	+ , - , ↓
PCI/VGA Palette Snoop	Disabled	+ , - , ↓
Passive Release	Enabled	+ , - , ↓
Delayed Transaction	Enabled	+ , - , ↓
Supervisor I/O Base Addr.	190h	+ , - , ↓
Power-Supply Type	AT	+ , - , ↓
AGP Aperture Sizo (MB)	64	+ , - , ↓
Video BIOS Shadow	Enabled	+ , - , ↓
C0000-C0FFF Shadow	Auto	+ , - , ↓
CC000-CFFFF Shadow	Auto	+ , - , ↓
D0000-D3FFF Shadow	Auto	+ , - , ↓
D4000-D7FFF Shadow	Auto	+ , - , ↓
D0000-D0FFF Shadow	Auto	+ , - , ↓
DC000-DFFFF Shadow	Disabled	+ , - , Esc, ↓

SETTINGS	SET TO	KEYS
POWER MANAGEMENT SETUP		Enter
ACPI Function	Disabled	+ , - , ↓
Power Management	User Define	+ , - , ↓
PM Control by APM	No	+ , - , ↓
Video Off Method	V/H SYNC+Blanc	+ , - , ↓
Video Off After	NA	+ , - , ↓

SETTINGS	SET TO	KEYS
Doze Mode	Disable	+ , - , ↓
Standby Mode	Disable	+ , - , ↓
Suspand Mode	Disable	+ , - , ↓
HDD Power Down	Disable	+ , - , ↓
HDD Down When Suspend	Disabled	+ , - , ↓
Throttle Duty Cycle	75.0 %	+ , - , ↓
PCI/VGA Art-Monitor	Disabled	+ , - , ↓
Soft-Off by PWR-BTTN	Instant-Off	+ , - , ↓
Resume by Ring	Disable	+ , - , ↓
IRQ 8 Break Suspend	Disable	+ , - , ↓
Resume by Alarm	Disabled	+ , - , ↓
Reload Global Timer Events		
IRQ (3-7, 9-15), NMI	Disabled	+ , - , ↓
Primary IDE 0	Disabled	+ , - , ↓
Primare IDE 1	Disabled	+ , - , ↓
Secondary IDE 0	Disabled	+ , - , ↓
Secondary IDE 1	Disabled	+ , - , ↓
Floppy Disk	Disabled	+ , - , ↓
Serial Port	Disabled	+ , - , ↓
Parallel Port	Disabled	+ , - , Esc, ↓

SETTINGS	SET TO	KEYS
PNP/PCI CONFIGURATION		Enter
PNP OS Installed	No	+ , - , ↓
Resources Controlled BY	Manual	+ , - , ↓
Reset Configuration Data	Disabled	+ , - , ↓
IRQ3	PCI/ISA PnP	+ , - , ↓
IRQ4	PCI/ISA PnP	+ , - , ↓
IRQ5	PCI/ISA PnP	+ , - , ↓
IRQ7	PCI/ISA PnP	+ , - , ↓
IRQ9	PCI/ISA PnP	+ , - , ↓
IRQ10	PCI/ISA PnP	+ , - , ↓

SETTINGS	SET TO	KEYS
IRQ11	Legacy ISA	+ , - , ↓
IRQ14	PCI/ISA PnP	+ , - , ↓
IRQ15	PCI/ISA PnP	+ , - , ↓
DMA Channel 0	PCI/ISA PnP	+ , - , ↓
DMA Channel 1	PCI/ISA PnP	+ , - , ↓
DMA Channel 3	PCI/ISA PnP	+ , - , ↓
DMA Channel 5	PCI/ISA PnP	+ , - , ↓
DMA Channel 6	PCI/ISA PnP	+ , - , ↓
DMA Channel 7	PCI/ISA PnP	+ , - , ↓
Init Display First	Onboard	+ , - , ↓
Assign IRQ For VGA	Disabled	+ , - , ↓
Assign IRQ For USB	Disabled	+ , - , ↓
PCI Latency Timer	32	+ , - , ↓
SpecialIRQrOUTING	PC104+	+ , - , ↓
Brige init.delay	150ms	+ , - , ↓
Brige cache size	16	+ , - , ↓
Used MEM base addr	N/A	+ , - , Esc, ↓
SETTINGS	SET TO	KEYS
CPU/BOARD FEATURES SETUP		Enter
Current Processor(s) Speed	433 MHZ	+ , - , ↓
Front Side Bus Speed	66 MHZ	+ , - , ↓
Thermal Management	Disabled	+ , - , ↓
Save CMOS in FLASH	Enabled	+ , - , ↓
Wathdog Timer	Disabled	+ , - , Esc, ↓
INTEGRATED PERIPHERIALS		Enter
On-Chip Primary PCI IDE	Enabled	+ , - , ↓
IDE Primary Master PIO	Auto	+ , - , ↓
IDE Primary Slave PIO	Auto	+ , - , ↓
IDE Primary Master UDMA	Auto	+ , - , ↓
IDE Primary Slave UDMA	Disabled	+ , - , ↓
On-Chip Secondary PCI IDE	Disabled	+ , - , ↓
IDE HDD Block Mode	Enabled	+ , - , ↓
Ethernet Controller	Enabled	+ , - , ↓

SETTINGS	SET TO	KEYS
USB Keyboard Support	OS	+ , - , ↓
PS/2 Mouse Control	Disabled (Auto for Enguard and Ensemble)	+ , - , ↓
Onboard FDC Controller	Disabled	+ , - , ↓
Onboard Serial Port 1	Auto	+ , - , ↓
Onboard Serial Port 2	Auto	+ , - , ↓
Serial Port 2 Mode	RS-232	+ , - , ↓
Onboard Parallel Port	378/IRQ7	+ , - , ↓
Parallel Port Mode	ECP+EPP1.9	+ , - , ↓
ECP Mode Use DMA	3	+ , - , Esc, ↓

7.3.9 Front Panel Test

Switch on the MPU, and verify that the green LED on the MPU front panel lights up.

Alternatively, press all function keys and verify buzzer sounds each time a key is pressed.

Press the Vital Signs key, then turn Quicknob to ECG position and verify that the icons change on the screen.

MPU Final Test

Connect the VGA color monitor to the MPU.

Connect the “Master” module rack to the MPU with the cable external - MPU to MR, P/N 550-314-010.

Insert “ Master “ ECG module into the module rack.

Connect the MPU to the AC outlet.

Plug ECG Simulator with cable into the ECG module. Verify correct cable connections.

Verify ECG waveforms on the Envoy monitor screen.

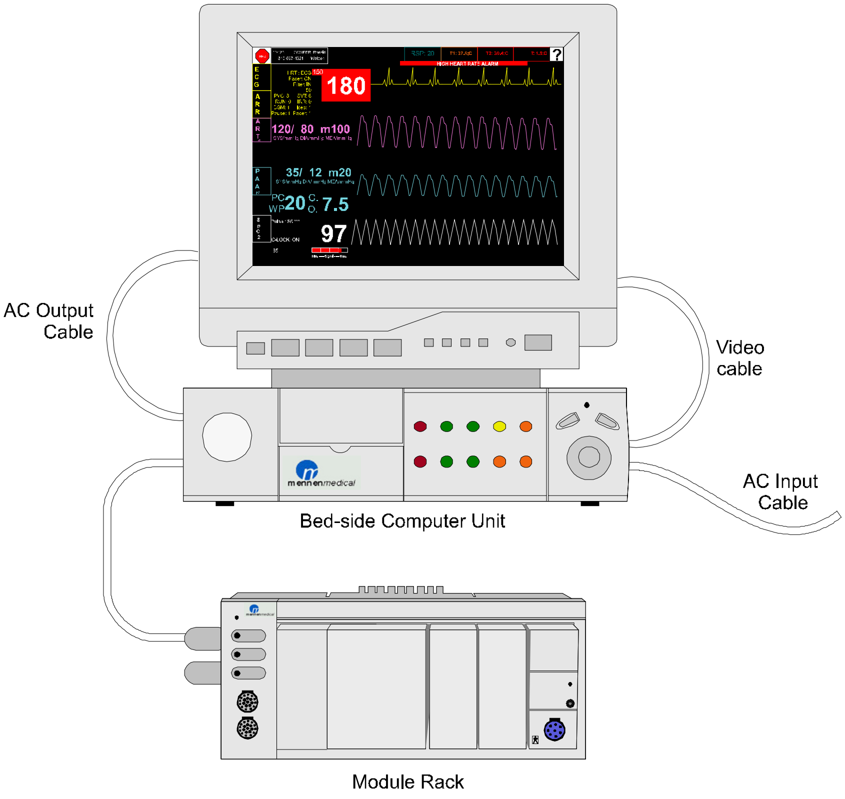

180
120/ 80 m100
35/ 12 m20
PCWP 20
C.O. 7.5
97
AC Output Cable
Video cable
AC Input Cable
Bed-side Computer Unit
Module Rack

Figure 7-15. Settings for MPU Functional Test

Speaker Test

Configure system to Audio tone (in Setup - Alarm Volume - Alarm Master Volume).

Initiate an ECG alarm, by setting the ECG Simulator to a value greater than the MPU "Hi alarm" limit. Verify an audio tone and a red display indicating the alarm.

Press the Silence button to stop alarm audio tone.

MPU To Nurse Station Communication Test

Connect the MPU to the Nurse Station "Ensemble" via the Ethernet hub.

On the Nurse Station display, check that the MPU transmits ECG baseline.

MPU Test Data Sheet

(P/N 554-000-000)

Ref.	Subject	Description	Spec.	Measured value	Result (Pass/Fail)
1	Visual Inspection				
2	Figure 7-13b. MPU Components; New Power Supply Installed Connections for Test				
	Fans Test		O.K.		
3	Internal Power Supply Voltages Test	Old T.B. = 6+, 8- New T.B. = 7+,6-	5 ± 0.2V		
		Old T.B. = 5+,8- New T.B. = 3+,6-	12 +0.9/ -0.3V		
		Old T.B. = 3+,4- New T.B. = 1+,4-	12 +0.9/ -0.3V		

4	**7.3.7.5a** **BIOS Setup**		**O.K.**		
	Reload	**Label** **Ver.no.**	**O.K.**		
	Functional test				

7.4 Module Rack Functional Tests

This section provides the required procedures for testing Module Rack functionality, P/N 553-000-000 of the ***Envoy*** bedside monitor.

The functional tests includes the following procedures:

- Software version verification
- Quick test
- Final test

Required Equipment

- “Master” Main Processing Unit (MPU), P/N 554-000-000 with program loaded
- VGA Color Display with connection cables
- Cable extension MPU to MR, P/N 550-314-010
- “Master” Module ECG, P/N 551-103-000
- “Master” Module SpO_2, P/N 551-131-000
- PC with DOS V 6.22 or later
- Serial cable to PC COM11 connection
- Adapter ic485-I with special cable
- AC/DC Adapter to 12V
- Load Program “MR” (on floppy or hard disk)

7.4.1 Software Version Verification

First, check that the existing software version matches the last version you have received from Mennen Medical, and then, if necessary, upgrade the software.

See *Chapter 4 – Upgrading Software, Section 4.3 Upgrading the Modules Software*.

7.4.2 Quick Test

Connect MPU to MR with inter-connect cable as shown. 550-314-010. Connect the VGA color display (See Figure 7-16.).

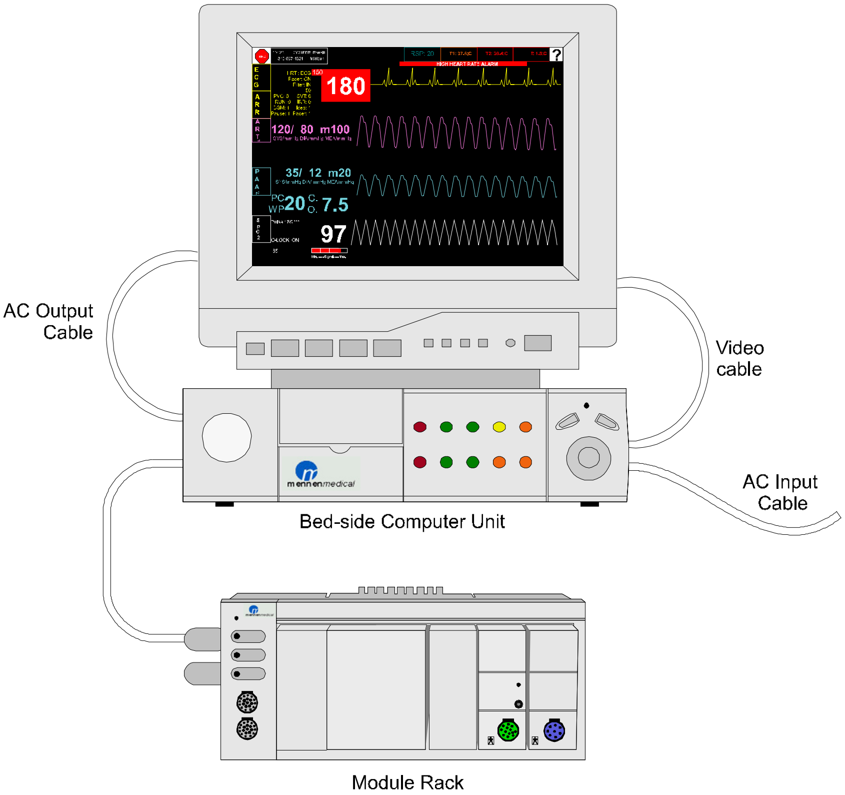

AC Output Cable
Video cable
AC Input Cable
Bed-side Computer Unit
Module Rack

Figure 7-16. Settings for Performing a Quick Test

2. Put “Master” SpO_2 module into slot #6 of the MPU.
3. Put “Master” ECG module into slot #5 of the MPU.
4. Switch MPU on.
5. Make sure waveforms of SpO_2 and ECG appear on the screen (if needed, use monitor configuration).
6. Press Vital Signs key on the MPU, and verify correct module-slot identification.

7.4.3 Module Rack Final Test

1. Connect MPU to MPU with cable extension - MPU to MR, P/N 550-314-010. Connect the VGA color display (See Figure 7-16).
2. Put “Master” SpO_2 module into slot #6 of the MPU.

3. Put “Master” ECG module into slot #5 of the MPU.
4. Switch MPU on.
5. Press Vital Signs key on the MPU, and verify correct module-slot identification.
6. Make sure waveforms of SpO_2 and ECG appear on the screen (if needed, use monitor configuration).
7. Change place of “Master“ ECG module as follows; when changing place, verify waveforms on the screen and correct module-slot identification:

   from slot #5 to slot #4

   from slot #4 to slot #3

   from slot #3 to slot #2

   from slot #2 to slot #1

8. Change place of “Master“ SpO_2 module as follows; when changing place, verify waveforms on the screen and correct module-slot identification:

   from slot #6 to slot #5

   from slot #5 to slot #4

   from slot #4 to slot #3

   from slot #3 to slot #2

9. Change place of “Master” ECG module from slot #1 to slot #6. Verify waveforms on the screen and correct module-slot identification
10. Change place of “Master” SpO_2 module from slot#2 to slot #1. Verify waveforms on the screen and correct module-slot identification
11. Disconnect the “Master” module SpO_2 from the module rack under test.
12. Disconnect the “Master” module ECG from the module rack under test.
13. Disconnect MPU from the module rack under test.

7.4.4 Test Data Sheet of Module Rack

(P/N 553-000-000)

Ref.	Subject	Description	Spec.	Measured value	Result (Pass/Fail)
1	Software Version Verification	Verify latest software version			
2	Quick Test				
	Slot #6 (SpO$_2$ module)	W/F Line	O.K.		
		Identification	O.K.		
	Slot #5	W/F Line	O.K.		
3	Module Rack Final Test				
	Slot #6 (SpO$_2$ module)	W/F Line	O.K.		
		Identification	O.K.		
	Slot #5 (ECG module)	W/F Line	O.K.		
		Identification	O.K.		
	ECG module change place to				
	Slot #4	W/F Line	O.K.		
		Identification	O.K.		
	Slot #3	W/F Line	O.K.		
		Identification	O.K.		
	Slot #2	W/F Line	O.K.		
		Identification	O.K.		
	Slot #1	W/F Line	O.K.		
		Identification	O.K.		
	SpO$_2$ module change place to				
	Slot #5	W/F Line	O.K.		
		Identification	O.K.		
	Slot #4	W/F Line	O.K.		
		Identification	O.K.		
	Slot #3	W/F Line	O.K.		
		Identification	O.K.		
	Slot #2	W/F Line	O.K.		
		Identification	O.K.		
	Slot #6 (ECG module)	W/F Line	O.K.		
		Identification	O.K.		
	Slot #1 (SpO2 module)	W/F Line	O.K.		
		Identification	O.K.		

Tested by ______________ Date ______________

Technician signature

7.5 Final Test of the Envoy Bedside Monitor

This section provides a comprehensive final test of the ***Envoy*** bedside monitor. It assumes that the person testing the unit has knowledge of the ***Envoy*** bedside monitor. The operator must configure the ***Envoy*** to display its available parameters, and record all the test data in the Test Data Sheet.

Required Equipment

- ECG Simulator, model DNI DYNATECH NEVADA INC., or similar
- TEMP Simulator, model FOGG TP69, or similar
- Blood Pressure Simulator, model FOGG M48, or similar, with BP Cable, P/N 551-306-010
- Cardiac Output Simulator, P/N 260-610-010, with CO Ice-Bath Cable, P/N 551-306-014
- Oximetry simulator, NELLCOR pocket tester, model PT-2500
- NELLCOR Pulse Oximetry cable, P/N 261-870-070
- SpO2-NELLCOR Cable, P/N 551-306-015
- NIBP ANALYZER, model “DYNATECH NEVADA” or BIO-TEK “BP Pump”
- Adult arm CUFF (CAS)
- Pediatric arm CUFF (CAS)
- SpO2 Simulator BIO-TEK, model “INDEX”
- Safety Analyzer BIO-TEK, model “601PRO”
- Defibrillator Cart
- HI POT TESTER 100 SERIES
- HI POT cables:
  - ECG
  - BP’s
  - CO
  - SpO2
  - AC
- 3 Lead Patient Cable, P/N 551-306-016
- 5 Lead Patient Cable, P/N 551-306-017
- Millimeter scale (ruler)

- CMR Test Box, with adapter for Envoy
- Cable for analog outputs test
- Oscilloscope, Tektromix TDS 320, or similar

7.5.1 General Tests

7.5.1.1 Visual Inspection

- Inspect the Envoy for defects in workmanship (scratches, missing hardware, etc.).
- Check to ensure all required paperwork is attached and signed, including specific Test Procedures for single modules, the MR, etc.

- Check conformity of Envoy configuration to sales order. Check correct serial numbers, and verify no missing labels.
- Check pins of cable extension MPU to MR, P/N 550-314-010.
- Check monitor interconnections (Figure 7-17).

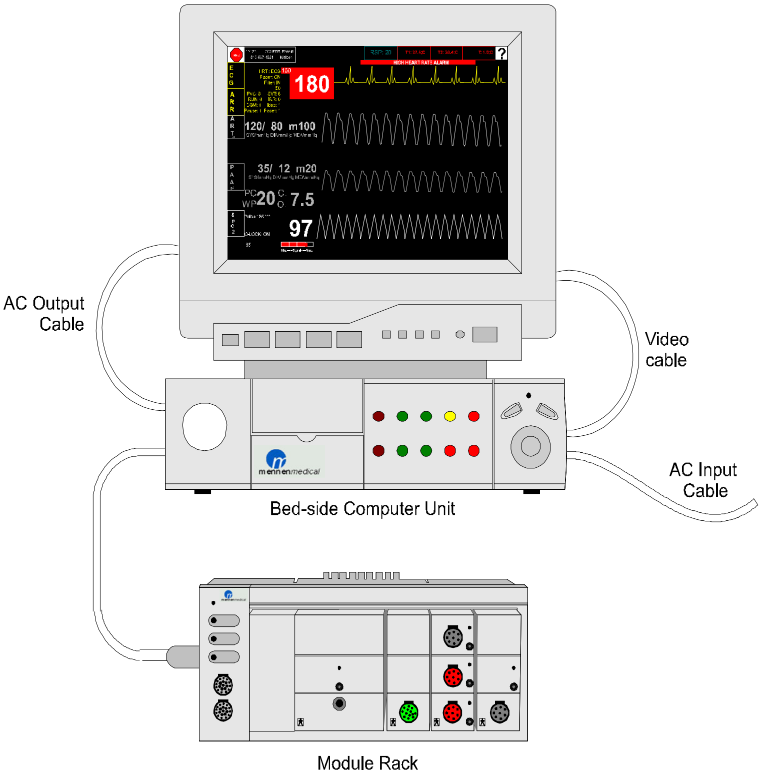

AC Output Cable
Video cable
AC Input Cable
Bed-side Computer Unit
Module Rack
180
120/ 80 m100
35/ 12 m20
20
7.5
97

Figure 7-17. Monitor Interconnections

7.5.1.2 *Initial Power Up*

1. In the module rack:

    Insert the ECG module into slot #6 of the MR.

    Insert module 2BP/CO into slot #5 of the MR.

    Insert module SpO2 into slot #4 of the of the MR.

    Insert module NIBP into slots #2, 3 of the MR.

2. Turn on the MPU.
3. Press the Vital Signs key of the ***Envoy***, and verify correct module-slot identification.
4. Set the ***Envoy*** to monitor all available parameters. Verify waveforms and parameters on the display.
5. Check module LEDs:

    module rack - green

    module ECG - red

    module NIBP - green

6. Plug Simulator cables into the modules. Check correct cable connection.
7. Verify on the ECG module that the green LED is blinking instead of the red LED, and on the module 2BP/CO two red LEDs.

7.5.1.3 *Keyboard Click Test*

1. Alternatively, press the four keys (“Mark Event”, “Record”, “Help”, “Escape”), and check for buzzer sound.
2. Press Vital Signs key, and turn QuicKnob to Temperature position. Check the changes on the screen and buzzer sound.

7.5.1.4 *Monitor Setup*

Configure the following for ECG and BP:

ECG:

Gain - 1

Show channels - 1

Grid - yes

Scale - yes

Pacemaker (Display Pacemaker pulse) - yes

BP:

BP1 - ART

BP2 - PAP

7.5.2 Safety Tests

7.5.2.1 Dielectric Strength Tests

Perform test as defined in TP 416-001 REV.I

7.5.2.2 BIO-TEC 601PRO Safety Analyzer Test

Perform test as defined in TP 416-001 REV. I

7.5.3 Envoy Bed Side Monitor Final Tests

7.5.3.1 Location Test

1. Turn on the MPU.
2. Press Vital Signs key of the ***Envoy***, and verify the correct module-slot identification.
3. Alternatively, unplug and plug modules in the module rack, and verify correct module-slot identification.

7.5.3.2 Patient Cable Status Test

1. Check to ensure all patient cables are disconnected from the ***Envoy***.
2. Verify that the “ECG Cable out” and “SpO2 Cable out” messages appear on the monitor screen.
3. Plug 5 lead patient cables to the ***Envoy***.
4. Verify that the “ECG Cable out” message disappears.
5. Plug SpO2 patient cable (without Simulator’s connection) to the ***Envoy***.
6. Verify that “SpO2 Cable out” message is replaced by “SpO2 Relocate Probe”.
7. Check for the “ART Cable out” and “PAP Cable out” messages on the monitor screen.
8. Plug BP patient cables to the ***Envoy***.
9. Verify that the following messages appear:

   “ART 1Not Zeroed”

   “PAP 2 Not Zeroed”

7.5.3.3 Common Mode Rejection Test (CMR)

1. Unplug the ECG simulator cable, and plug the CMR Test Box with adapter for to the ***Envoy***.
2. Connect AC line cord of the CMR Test Box to the same AC wall outlet as the ***Envoy***, and turn it on.
3. Configure all leads of the ***Envoy*** for GAIN 8.
4. Select Lead I on the monitor and do the following:

   Verify ECG scale 10mm on the calibrated 15” display (as per calibration pulse).

   Verify that RL switch of the CMR Test Box is out.

   Press LA switch. Verify less than or equal to specified p-p signal.

   Press RA switch. Verify less than or equal to specified p-p signal.
5. Select Lead II on the monitor and do the following:

   Verify ECG scale 10mm on the calibrated 15” display (as per calibration pulse).

   Check that RL switch of the CMR Test Box is out.

   Press LL switch. Verify less than or equal to specified p-p signal.

   Press RA switch. Verify less than or equal to specified p-p signal.
6. Select Lead III on the monitor and do the following:

   Verify ECG scale 10mm on the calibrated 15” display (as per calibration pulse).

   Check that RL switch of the CMR Test Box is out.

   Press LL switch. Verify less than or equal to specified p-p signal.

   Press LA switch. Verify less than or equal to specified p-p signal.

7. Select Lead V1 on the monitor and do the following:

   Verify ECG scale 10mm on the calibrated 15” display (as per calibration pulse).

   Check that RL switch of the CMR Test Box is out.

Press switch C. Verify less than or equal to specified p-p signal.

7.5.3.4 Noise Test

1. Turn off the AC switch of the CMR Test Box.
2. Check that all switches of the CMR Test Box are off.
3. Check that the ***Envoy*** is configured to GAIN 8.
4. Select Leads I, II, III, and V1 of the Envoy for display one at a time. In each case, verify less than or equal to the specified baseline noise p-p.
5. Verify ECG Scale 10mm on the calibrated 15” display (as per calibration pulse).

7.5.3.5 *ECG Test*

3 Leads ECG Test

1. Unplug the 5 Lead cable and replace it with the 3 Lead cable.
2. Set the rate to 60 Bpm.
3. Verify that ECG Leads I (GAIN = 1), II (GAIN = 1), and III (GAIN = 2), are operational.
4. Check for p-p amplitudes that are within the specs listed on the Test Data Sheet.
5. Plug the 5 Lead cable.

ECG Leads TEST

1. Set the ECG Simulator to Heart Rate - 60 Bpm with Pacer.
2. Adjust GAIN to GAIN = 1.
3. Display each of the available ECG Leads: I, II, III and V1 (for 5 Lead cable) one at a time, and check for p-p amplitudes that are within the specs listed on the Test Data Sheet.

A vertical line pacer pulse marker appears before each P wave. The ECG waveform itself must not be distorted. Check for a count of 60 Bpm ± 2 for Lead I.

4. Switch the Display Pacemaker pulse to inactive position. Verify that the vertical line pacer disappears.

ECG ALARM

1. Check to ensure that Alarm Master Volume is configured to audio tone.

2. Initiate an ECG alarm by setting the ECG Simulator to a value greater than the “Hi alarm” limit set in the Envoy . Verify an audio tone and a red display indicating the alarm.
3. Press the Silence button to stop alarm audio tone.

ECG FAULTS

2. Remove the RA, LA, LL, RL and V1 Leads from the ECG Simulator one at a time.

A “Lead Fault” message is displayed for each lead as it is removed, and should disappear when the lead is reconnected.

Verify that module’s red LED is blinking on the LED fault function.

Remove all leads from the ECG Simulator, and verify that the “All Lead Fault” message appears on the screen.

7.5.3.6 Temperature Test

Temperature Channel 1

Set the Temperature simulator to the 39°C ± .1°C, and verify a correct display on the ***Envoy***.

Temperature Channel 2

Set the Temperature simulator to the 37 °C ± .1°C, and verify a correct display on the ***Envoy***.

7.5.3.7 Blood Pressure Test

Blood Pressure 1 Zero

1. Set the Simulator to 0 mmHg. Push the Zero button on the module.
2. Make sure that the LED on the module is green, and that the value 0 /0 / m 0 ± 1 mmHg appears on the monitor display.
3. Unplug and plug BP1Patient cable. In the BP menu, select Zero Pressure, and click Zero BP.
4. Make sure that that the following appear on the monitor screen:

   a green “traffic-light”

   “Zero Has Succeeded” message

   Value 0 /0 / m 0 ± 1 mmHg on the monitor screen

5. Manually configure BP1 RANGE to 0-300 mmHg.

Blood Pressure 2 Zero

1. Set the Simulator to 0 mmHg. Push the Zero button on the module.
2. Verify the green LED on module, and the value 0 /0 / m 0 ± 1 mmHg on the monitor display.
3. Unplug and plug BP2 Patient cable. In the BP menu, select Zero Pressure, and click Zero BP.
4. Make sure that the LED on the module is green, and that the value 0 /0 / m 0 ± 1 mmHg appears on the monitor display.
5. Manually configure BP2 RANGE to 0-300 mmHg.

BP1 Functional

1. Check that BP1 is set to zero.
2. Set the BP Simulator to STATIC 250 mmHg. Verify that monitor value is 250 mmHg ± 5 mmHg.
3. Set the BP Simulator to the W/F position. Verify a BP1 waveform.

BP2 Functional

1. Check that BP2 is set to zero.
2. Set the BP Simulator to STATIC 150 mmHg. Verify monitor value is 150 mmHg ± 4 mmHg.
3. Set the BP Simulator to the W/F position. Verify a BP2 waveform.

Blood Pressure alarms

Set the BP Simulator to exceed an alarm limit on both BP channels, and verify an alarm.

7.5.3.8 Cardiac Output Test

1. Connect the CO simulator with Ice-Bath cable to the Envoy Turn on the simulator and set it to Ice position.

2. Set the computation constant of the monitor to .542.

3. Copy Specifications from the simulator back panel label to the Test Data Sheet “Specifications” column, as follows:

Ice Injectate Ti ____

Blood Temp Tb ____

Cardiac Output CO ____

5. After the green light appears in the CO window, press the “Inject” button.
6. Verify that monitor values are within limits.
7. Repeat this measurement three times, and verify that values are within the limits.
8. Record all values in the Test Data Sheet.

7.5.3.9 Analog Outputs Test

ECG Analog Output

1. Check to be sure ECG Simulator connection to the ECG Module.

2. Set ECG to lead I.

3. Connect Analog Output “ECG” of the Module Rack to Oscilloscope with Cable for analog outputs test.

4. Verify correct ECG waveform 1V p-p ± 100 m V.

Art Analog Output

1. Connect Analog Output “ART” of the Module Rack to Oscilloscope with Cable for analog outputs test.

2. Verify signal +2.5 Volts DC on the Oscilloscope’s screen.

Aux Analog Output

1. Connect Analog Output “AUX” of the Module Rack to Oscilloscope with Cable for analog outputs test.
2. Verify signal -2.5 Volts DC on the Oscilloscope’s screen.

7.5.3.10 SpO2 Test

SpO2 Quick Test

1. Connect the NELLCOR pocket tester PT-2500 to the NELLCOR cable. The monitor must be configured to display the SpO2 waveform and pulse rate parameters.
2. Plug the simulator/cable assembly into the Envoy connector. Verify a clean square wave centered in the Pulse W/F display area.
3. Verify that a SpO2 value of 81 % ± 1 is displayed.
4. Verify that a pulse rate of 40 Bpm ± 1 Bpm is displayed.

BIO-TEK Simulator Finger Test

Setup for SpO_2 “INDEX” BIO-TEK simulator

1. Turn on Simulator power.
2. Set main menu 2 in the Make position to NELLCOR.
3. Set main menu 1 in the SIM (Simulations) position to MAN:

   SpO_2: 96%

   Pulse : 60 Bpm

   SpO2 “FINGER” Test
4. Connect Sp02 simulator “INDEX” BIO-TEK with NELLCOR patient cable to the Envoy .
5. Verify SpO2 undistorted patient waveform.
6. Verify pulse rate to 60 Bpm ± 1 Bpm, and SpO2 to 96 % ± 1%.

7.5.3.11 NIBP Test

Setup NIBP

For “DYNATECH NEVADA” ANALYZER

1. Connect a T-air connector of NIBP Analyzer to ADULT ARM CUFF with the plastic arm simulator, and to the NIBP connector of the Envoy .

2. Turn Power of NIBP Analyzer on. Check the main menu for device's Self Test.

For BIO-TEK "BP Pump"

3. Connect Pressure Port of the NIBP monitor tester and NIBP(CAS) connector of the Envoy .
4. Turn power of NIBP monitor tester on. Check the Presets Mode menu for device's Self Test (Standard set of Pretests #1) .

Adult Mode Functional Test

For "DYNATECH NEVADA"

1. Check the ADULT ARM CUFF connections. Set the NIBP Analyzer to SELECT BP, ADAMS ADULT.
2. Press the Start/Stop button on the Envoy front panel. The pressure determination cycle begins. Allow the Envoy to pump up the cuff. Verify that the green LED is blinking on the Envoy front panel. Press the Start/Stop button on the Envoy front panel. The pressure determination cycle stops.
3. Set Target Values to 120/80 (90) mmHg. Check set-up of the Envoy to a 2 min interval. Press Start button of Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the cuff. When the pump stops, check for message NIBP 120/80(90) ± 10 mmHg .
4. Set Target Values to 255/195(215) mmHg. Press Start button of Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the cuff. When the pump stops, check for message NIBP 255/195(215) ± 10 mmHg.
5. Set Target Values to 60/30(40) mmHg. Press Start button of the Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the cuff. When the pump stops, check for message NIBP 60/30(40) ± 10 mmHg.

For BIO-TEK "BP Pump"

1. Check to ensure the NIBP monitor tester is configured to "Standard set of Pretests #1":
   Sys -120 mmHg Dia - 80 mmHg M - 93 mmHg HR - 80 BPM
2. Press Start button of Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the internal cuff of the NIBP monitor tester. When the pump stops, check for message NIBP 120/80(93) ± 10 mmHg.

3. Using arrow keys of the NIBP monitor tester, change menu to "Standard set of Pretests #4":
   Sys -255 mmHg Dia - 195 mmHg M - 215 mmHg HR - 80 BPM
4. Press the Start button of Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the internal cuff of the NIBP monitor tester. When the pump stops, check for message NIBP 255/195(215) ± 10 mmHg .
5. Using arrow keys of the NIBP monitor tester, change menu to "Standard set of Pretests #5":
   Sys - 60 mmHg Dia - 30 mmHg M - 40 mmHg HR - 80 BPM
6. Press the Start button of the Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the internal cuff of the NIBP monitor tester. When the pump stops, check for message NIBP 60/30(80) ± 10 mmHg .

Neonatal Mode Functional Test

For "DYNATECH NEVADA"

1. Connect the PEDIATRIC ARM CUFF instead of the ADULT ARM CUFF. Set the NIBP Analyzer to SELECT BP, ADAMS NEONATE. Set the Envoy factory configuration to NEO. Set Target Values to 80/50(62) mmHg .
2. Check set-up of the Envoy to NIBP ON, and to a 2 min interval.
3. Press the Start button of the Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the cuff. When the pump stops, check for message NIBP 60/30(40) ± 10 mmHg .
4. Set Target Values to 80/50(62) mmHg. Press the Start button of the Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the cuff. When the pump stops ,check for message NIBP 80/50(62) ± 10 mmHg .
5. Set Target Values to 120/80(90) mmHg. Press the Start button of Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the cuff. When the pump stops, check for message NIBP 120/80(90) ± 10 mmHg .

For BIO-TEK "BP Pump"

6. Configure the NIBP monitor tester to Neonatal mode:

   Press the "mode" key until "Configure" light
   illuminates and "Select a configuration parameter"

message appears on the NIBP monitor tester display.

Press “select” key, and using arrow keys change configuration to “Neonate - Internal Cuff”.

Press “mode” key until “Simulation” light illuminates.

Press “select” key to change BP parameters.

Using arrow keys, change Sis to 70 mmHg.

Press “select” key. Using arrow keys change Dia to 50 mmHg.

Press “select” key. Using arrow keys change HR to 200 Bpm.

Press “OK” to enter parameters in system.

Verify the “Simulation” menu parameters on the NIBP monitor tester display:

Sis 70 M 56 Dia 50 HR 200 Maximum Pulse Volume 100% Neonate Internal Cuff.

7. Press the Start button of the Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the internal cuff of the NIBP monitor tester. When the pump stops, check for message NIBP 70/50(56) ± 10 mmHg.
8. Press the “select” key to change BP parameters. Using arrow keys, change Sis to 60 mmHg.
9. Press the “select” key. Using arrow keys, change Dia to 30 mmHg.
10. Press “OK” to enter parameters in system.
11. Verify “Simulation” menu parameters on the NIBP monitor tester display:

Sis 60 M 40 Dia 30 HR 200 Maximum Pulse Volume 100% Neonate Internal Cuff.

12. Press the Start button of the Envoy . The pressure determination cycle begins. Allow the Envoy to pump up the internal cuff of the NIBP monitor tester. When the pump stops, check for message NIBP 60/30(40) ± 10 mmHg .

7.5.3.12 EtCO$_2$ Test

Module Location and Sensor Out Test

1. Unplug and plug module EtCO$_2$ in the MR.

2. On Vital Sign window of the monitor, verify correct slot-module identification.
3. Check for “EtCO$_2$ Initializing” message on the EtCO$_2$ field of the monitor screen.
4. After approximately 20 seconds, check for message “EtCO$_2$ Cable Out”.

Mainstream Sensor

Mainstream Sensor IN

5. Connect the Mainstream CO$_2$ sensor to the EtCO$_2$ input connector, and verify that the message “EtCO$_2$ Initializing” is displayed. The sensor warm-up period varies from approximately 0.5 to 2.0 minutes. On the module front panel, verify that the red LED blinks during the warm-up.
6. After the sensor warms up, check that the green LED is on and verify the following values:

   0/ 0 0

   EtCO$_2$/mmHg in CO$_2$/mmHg RSP/BPM

Co$_2$ Waveform and Breaths Detect

7. Take 5-10 breaths through the tube of the sensor. Observe the changes of the waveform as the exhalation and inhalation cycles occur. The waveform appears hump shaped, and occurs with each Inhalation/Exhalation cycle. Verify that the monitor detects breaths, and that the Co$_2$ data changes and displays the following:

   28/ 0 20

   Et CO$_2$/mmHg in CO$_2$/mmHg RSP/BPM

***Note**: These values are for reference only. Each person displays different CO$_2$ concentration and respiration levels.*

8. Stop breathing into the sensor tube, and verify that the waveform displayed becomes a flat line (0 mmHg), and the CO$_2$ data, after the apnea timeout period of approximately 20 seconds, changes to:

   0/ 0 0

   EtCO$_2$ /mmHg in CO$_2$/mmHg RSP/BPM

Sidestream Sensor

Sidestream Sensor IN

1. Disconnect the Mainstream CO_2 sensor from the Et CO_2 input connector, and plug the Sidestream CO_2 sensor to the special input. Check that the message "EtCO_2Initializing" is displayed.
2. After approximately 20 seconds, verify (via sound) that the module internal pump is operating, and that front panel LED is green. Verify the following values:

   0/ 0 0

   EtCO_2/mmHg in CO_2/mmHg RSP/BPM

CO_2 Waveform and Breaths Detect

3. Take 5-10 breaths through the tube of the sensor. Observe the changes of the waveform as the exhalation and inhalation cycles occur. The waveform appears hump shaped, and occurs with each Inhalation/Exhalation cycle.
4. Verify that the monitor detects breaths, and that the CO_2 data changes and displays the following values:

   28/ 0 20

   EtCO_2/mmHg in CO_2/mmHg RSP/BPM

Note: These values are for reference only. Each person displays different CO_2 concentration and respiration levels.

5. Stop breathing into the sensor tube and verify that the waveform displayed becomes a flat line (0 mmHg), and that the CO_2 data, after the apnea timeout period of approximately 20 seconds, changes to:

   0/ 0 0

   EtCO_2/mmHg in CO_2/mmHg RSP/BPM

Technical Alarms Messages

1. Cover both sides of the sidestream sensor tube, and verify message: "Et CO_2 Replace Watertrap". Check that the internal pump ceased operating.
2. Unplug the Sidestream sensor, and verify message: "Et CO_2 No Watertrap Found".

7.5.3.13 Nurse Station Test

1. Connect monitor ISO LAN connector to the Nurse Station "Ensemble" setup.

2. Check that the Envoy transmits a complete dump of all activated parameters. Verify this data on the Nurse Station display.

7.5.4 Envoy Bedside Monitor Test Data sheet

Ref.	Subject	Description	Spec	Measured value	Result (Pass/Fail)
7.5.1	Visual inspection		O.K.		
7.5.1.2	Initial power up				
	Module-slot ident.	Vital signs	O.K.		
	Without patient	Module rack green LED	O.K.		
	Cables	Module ECG red LED	O.K.		
		Module NIBP green LED	O.K.		
	With patient	Module ECG green LED blinks	O.K.		
	Cables	Modules BP & BP2 2 red LEDS	O.K.		
7.5.1.3	Keyboard click test		O.K.		
7.5.2	Safety tests				
7.5.2.1	Dielectric strength test	See TP 416-001	O.K.		
7.5.2.2	601 Pro safety test	See TP 416-001	O.K.		
7.5.3	Final system test				
7.5.3.1	Location test		O.K.		
7.5.3.2	Cable status				
	ECG cable		O.K.		
	BP1 cable		O.K.		
	BP2 cable		O.K.		
	SpO2 cable		O.K.		
7.5.3.3	CMR test				
	Lead I		< 6 mm		
	Lead II		< 6 mm		
	Lead III	GAIN 8	< 6 mm		
	Lead V1		< 6 mm		

Ref.	Subject	Description	Spec	Measured value	Result (Pass/Fail)
1	Noise test				
	Lead I		< 3 mm		
	Lead II		< 3 mm		
	Lead III	GAIN 8	< 3 mm		
	Lead V1		< 3 mm		
7.5.3.5	ECG test				
	3 Leads				
	I Lead	GAIN= 1	1.0 mV ± .2 mV		
	II Lead	GAIN= 1	1.4mV ± .2 mV		
	III Lead	GAIN= 2	0.4 mV ± .2 mV		
	5 Leads test				
	Lead I	AMPLIT.	1.0 mV ± .2 mV		
		Waveform	O.K.		
		Counting	60 Bpm ± 2		
		Pacer on	O.K.		
		Pacer off	O.K.		
	Lead II	AMPLIT.	1.2 mV ± .2 mV		
		Waveform	O.K.		
		Pacer on	O.K.		
		Pacer off	O.K.		
	Lead III	AMPLIT.	.4 mV ± .2 mV		
		Waveform	O.K.		
		Pacer on	O.K.		
		Pacer off	O.K.		
	Lead V1	AMPLIT.(negat.)	1.0 mV ± .2 mV		
		Waveform	O.K.		
		Pacer on	O.K.		
		Pacer off	O.K.		
	ECG alarm	Audio tone red displ.	O.K.		

Ref.	**Subject**	**Description**	**Spec**	**Measured value**			**Result (Pass/Fail)**
	ECG faults	RA	O.K.				
		LA	O.K.				
		LL	O.K.				
		RL	O.K.				
		V1	O.K.				
		All Lead fault	O.K.				
7.5.3.6	Temperature test						
	Temp 1		39 °C ± .2				
	Temp 2		37 °C ± .2				
7.5.3.7	Blood pressures						
	BP 1 zero -	Green LED	O.K.				
	Push zero button	Value	0/ 0 /m 0 ± 1 mmHg				
	BP 1 zero -	Green traffic-light	O.K.				
	Monitor menu	Value	0/ 0 /m 0 ± 1 mmHg				
	BP 2 zero -	Green LED	O.K.				
	Push zero button	Value	0/ 0 /m 0 ± 1 mmHg				
	BP 2 Zero -	Green traffic-light	O.K.				
	MONITOR MENU	Value	0/ 0 /m 0 ± 1 mmHg				
	BP1 functional	Value	+250 mmHg ± 5				
		Waveform	O.K.				
	BP2 functional	Value	+150 mmHg ± 4				
		Waveform	O.K.				
	BP alarms		O.K.				
7.5.3.8	Cardiac output			Inj .1	Inj .2	Inj .3	
	Comp.Const. .542	Ice Injectate (Ti)	°C ± 0.3°C				
		Blood temp (Tb)	°C± 0.5°C				
	Measure 3 times	CO	L/min± 10%				
6.5.3.9	Analog Output						

Ref.	Subject	Description	Spec	Measured value	Result (Pass/Fail)
	ECG analog output	ECG Waveform	1V p-p ± 100 mV		
	Art analog output	DC value	+2.5V ± 200 mV		
	Aux analog output	DC value	+2.5V ± 200 mV		
7.5.3.10	SpO2 test				
	SpO2 quick test				
	with	Waveform	O.K.		
	NELLCOR pocket	SpO2 value	81% ±1		
	tester	Pulse rate	40 Bpm ±1		
	Sp02 Finger test				
	with BIO-TEK	Waveform	O.K.		
	“INDEX”	SpO2 value	96 % ±1		
		Pulse rate	60 Bpm ±1		
7.5.3.11	NIBP test				
	Module start/stop	Functional green LED	O.K.		
	ADULT mode	With adult	120/80(90) mmHg ± 10		
	Test	CUFF	255/195(215) mmHg ± 10		
		(for Dynatech Anal.)	60/30(40) mmHg ± 10		
	NEONAT. MODE	With Pediatric	80/50(62) mmHg ± 10 (for Dynatech Anal.)		
	TEST	CUFF	70/50(56) mmHg ± 10 (for BIO-TEK BP PUMP)		
		(for Dynatech Anal.)	60/30(40) mmHg ± 10		
7.5.3.12	EtCO$_2$ test				
	Module location and				

Ref.	Subject	Description	Spec	Measured value	Result (Pass/Fail)
	sensor out				
	Location test		O.K.		
	Sensor out	“$EtCO_2$ cable out”	O.K.		
	Mainstream sensor				
	Sensor in	“$EtCO_2$ cable out”	O.K.		
		Warming-red LED	O.K.		
		Green LED	0/0 0		
	Waveform and breath detect				
	Waveform	In/Exhalation	O.K.		
	Breath detect	$EtCO_2$	28 mmHg		
	(different for each person)	$inCO_2$	0 mmHg		
		RSP	20 Bpm		
	Stop breathing		0/ 0 0		
	Sidestream sensor				
	Sensor in	Internal pump	O.K.		
		Green LED	0/0 0		
	Waveform and breath detect				
	Waveform	In/Exhalation	O.K.		
	Breath detect	$EtCO_2$	28 mmHg		
	(different for each	$inCO_2$	0 mmHg		
	person)	RSP	20 BPM		
	Stop breathing		0/ 0 0		
	Technical alarms messages				
	$EtCO_2$ replace waterap		O.K.		
	$EtCO_2$ no watertrap found		O.K.		
7.5.3.13	N/S connection		O.K.		

Tested by ____________ Date ____________

Technician signature

Chapter 8

Parts List and Recommended Spare Parts

This chapter includes the following sections:

Accessories

Ensemble system - spare parts for 5 Central Station and 20 Envoy patient monitors for 5 years.

8.1 Accessories

The following cables, catheters, and electrodes are used to complete the interface between the patient and the ***Envoy***. They are available from Mennen Medical and can be ordered from your nearest Mennen Medical representative by specifying the part number.

Item and Description	Part Number (P/N)
ECG Cable Kit for 8 ECG Traces (Arrhythmia and ST Segment Analysis); 3/5/6 Leads Module	551-103-000
Dual Invasive BP & Cardiac Output/ 2 Temp Module	551-107-000
Non-Invasive Blood Pressure (NIBP) Module – dual size	551-130-000
Pulse Oximetry (Sp02) Module	551-131-000
EtCO2 Module – dual size	551-133-000
2 Temp Module	551-110-000
ECG Accessories	
3 Lead ECG Kit, Adult Snap*	551-306-080
3 Lead ECG Kit, Mini Clip*	551-306-081
3 Lead ECG Kit, Clip for O.R.*	551-306-082
3 Lead ECG Cable only*	551-306-016
Set of 3 Lead wires with Block, Snap*	551-306-024
Set of 3 Lead wires with Block, Mini Clip (Neonatal)*	551-306-028
Set of 3 Lead wires with Block, Clip for O.R.*	551-306-032
5 Lead ECG Cable only*	551-306-017
Set of 5 Lead wires with Block, Snap*	551-306-025
Set of 5 Lead wires with Block, Mini Clip*	551-306-029
Set of 5 Lead wires with Block, Clip for O.R.*	551-306-033
5 Lead ECG Kit, Adult Snap*	551-306-090
5 Lead ECG Kit, Mini Clip*	551-306-091
5 Lead ECG Kit, Clip for O.R.*	551-306-092
6 Lead ECG Kit, Adult Snap*	551-306-100
6 Lead ECG Kit, Mini Clip*	551-306-101
6 Lead ECG Kit, Clip for O.R.*	551-306-102
6 Lead ECG Cable (Molded Leads), Snap*	551-306-020
6 Lead ECG Cable only*	551-306-018
Set of 6 Lead wires with Block, Snap*	551-306-026

Item and Description	Part Number (P/N)
Set of 6 Lead wires with Block, Mini Clip*	551-306-030
Set of 6 Lead wires with Block, Clip for O.R.*	551-306-034
US Color Code	
3 Lead ECG Kit, Adult Snap**	551-306-280
3 Lead ECG Kit, Mini Clip**	551-306-281
3 Lead ECG Kit, Clip for O.R.**	551-306-282
3 Lead ECG Cable only**	551-306-216
Set of 3 Lead wires with Block, Snap**	551-306-224
Set of 3 Lead wires with Block, Mini Clip (Neonatal)**	551-306-228
Set of 3 Lead wires with Block, Clip for O.R.**	551-306-232
5 Lead ECG Cable only**	551-306-217
Set of 5 Lead wires with Block, Snap**	551-306-225
Set of 5 Lead wires with Block, Mini Clip**	551-306-229
Set of 5 Lead wires with Block, Clip for O.R.**	551-306-233
5 Lead ECG Kit, Adult Snap**	551-306-290
5 Lead ECG Kit, Mini Clip (Neonatal)**	551-306-291
5 Lead ECG Kit, Clip for O.R.**	551-306-292
EU Color Code	
Replacement Lead Wires	
Lead Wire Snap 1.3m, Red	551-306-041
Lead Wire Snap 1.3m, Black	551-306-042
Lead Wire Snap 1.3m, Green	551-306-043
Lead Wire Snap 0.8m, Red	551-306-044
Lead Wire Snap 0.8m, Yellow	551-306-045
Lead Wire Snap 0.8m, Brown	551-306-046
Lead Wire Snap 0.8m, White	551-306-047
Lead Wire Snap 0.8m, Black	551-306-048
Lead Wire Snap 0.8m, Green	551-306-049
Lead Wire Mini Clip	
Lead Wire Mini Clip 1.3m, Red	551-306-051
Lead Wire Mini Clip 1.3m, Black	551-306-052
Lead Wire Mini Clip 1.3m, Green	551-306-053
Lead Wire Mini Clip 0.8m, Red	551-306-054
Lead Wire Mini Clip 0.8m, Yellow	551-306-055

Item and Description	Part Number (P/N)
Lead Wire Mini Clip 0.8m, Brown	551-306-056
Lead Wire Mini Clip 0.8m, White	551-306-057
Lead Wire Mini Clip 0.8m, Black	551-306-058
Lead Wire Mini Clip 0.8m, Green	551-306-059
Lead Wire Clip for O.R.	
Lead Wire Clip for O.R. 1.3m, Red	551-306-061
Lead Wire Clip for O.R. 1.3m, Black	551-306-062
Lead Wire Clip for O.R. 1.3m, Green	551-306-063
Lead Wire Clip for O.R. 0.8m, Red	551-306-064
Lead Wire Clip for O.R. 0.8m, Yellow	551-306-065
Lead Wire Clip for O.R. 0.8m, Brown	551-306-066
Lead Wire Clip for O.R. 0.8m, White	551-306-067
Lead Wire Clip for O.R. 0.8m, Black	551-306-068
Lead Wire Clip for O.R. 0.8m, Green	551-306-069
BP Accessories	
BP Adapter Cable (Single)	551-306-011
BP Transducer Kit, Model MX860	800-060-580
Pressure Transducer MX860	800-060-582
Pressure Transducer Cable for MX860	800-060-584
Disposable dome for MX860 (5 domes/pak)	800-060-586
Mounting Clamp, vertical for MX860	800-060-588
Plate for mounting MX860	800-060-589
Disposable monitoring kit for MX860, 10 kits/pak	800-060-670
Cardiac Output Accessories	
Close Injected C.O. Cable Kit	551-306-110
C.O. Adapter cable, CO-Set Type	551-306-013
Injected Temperature Probe, CO-Set Type	800-030-450
Iced Bath C.O. Cable Kit	551-306-120
C.O. Adapter Cable, Ice Bath Type	551-306-014
Injected Temperature Probe, Ice Bath Type	800-060-050
Temperature Accessories	
Dual Temperature Adapter Cable	551-306-023
Temperature Probe, General Purpose, Adult	800-060-010
Temperature Probe, General Purpose, Pediatric	800-060-020
Temperature Probe, Surface	800-060-030

Item and Description	Part Number (P/N)
Non-Invasive BP Accessories	
Reusable NIBP Accessory Kits	
NIBP Accessory Kit, Adult	551-306-072
NIBP Accessory Kit, Pediatric	551-306-071
NIBP Accessory Kit, Infant	551-306-070
NIBP Accessory Kit, Adult/Pediatric	551-306-073
Reusable Cuff (Pack of 1)	
Cuff, Adult (14 x 37.5 cm)	800-061-322
Cuff, Large Adult (16 x 42 cm)	800-061-329
Cuff, Small Adult (12 x 30 cm)	800-061-328
Cuff, Child (9 x 27 cm)	800-061-323
Cuff, Small Child (7 x 21 cm)	800-061-327
Cuff, Infant (6 x 18 cm)	800-061-324
Reusable Cuffs (Box of 5)	
Cuffs, Adult (14 x 37.5 cm)	800-060-322
Cuffs, Large Adult (16 x 42 cm)	800-060-329
Cuffs, Small Adult (12 x 30)	800-060-328
Cuffs, Child (9 x 27 cm)	800-060-323
Cuffs, Small Child (7 x 21 cm)	800-060-327
Cuffs, Infant (6 x 18 cm)	800-060-324
Pulse Oximetry (Sp02) Accessories	
SpO2 Adapter Cable	551-306-015
Nellcor Finger Sensor, DS-100A	800-306-730
Nellcor Multi-Site Dura-Y Sensor, D-YS	800-060-930
Nellcor Ear Clip for Dura-Y Sensor, D-YSE	800-060-940
Nellcor Disposable Oxisensor, Pediatric Index Finger, D-20 (24 per case)	800-060-970
Peripheral Accessories	
Enscribe 400mm Network Recorder	550-040-000
Laser Printer 110 VAC Operation	550-OPT-113
Laser Printer 230 VAC Operation	550-OPT-114
Envoy Remote Display 15”	550-OPT-015
Envoy Remote Display 17”	550-OPT-017
Envoy Remote Display 20”	550-OPT-021

Item and Description	Part Number (P/N)
Etco2 Mainstream Accessories	
Mainstream Sensor II	800-060-980
Adult/Pediatric Disposable Airway Adapter (10/box)	800-060-981
Multi-Use Adult/Pediatric Airway Adapter (3/box)	800-060-982
Etco2 Sidestream Consumables	
Sample Line 7ft. (25 per box)	800-060-987
Sidestream Watertrap (10 per box)	800-060-983
Sidestream Watertrap (24 per box)	800-060-984
Sidestream Elbow (50 per box)	800-060-988
Sidestream Adult CO2 oral/nasal cannula (25 per box)	800-060-985
Sidestream Pediatric CO2 oral/nasal cannula (25 per box)	800-060-986
Recorder Paper	
40mm GRID Recorder Paper Roll	800-040-180
Mounting Devices	
Wall Mount, Single Arm Type	
Wall Mount for Envoy with 15”/17” Display (single arm)	800-050-810
Wall Mount for Envoy with 15”/17” Display and Recorder	800-050-820
Wall Mount for Envoy with 15”/17” Display and two Module Racks	800-050-840
Wall Mount for Envoy with 15”/17” Display, two Module Racks, and Recorder	800-050-830
Wall Mount, Dual Arm Type	
Wall Mount for Envoy with 15”/17” Display (dual arm)	800-050-815
Wall Mount for Envoy with 15”/17” Display and Recorder	800-050-825
Wall Mount for Envoy with 15”/17” Display and two Module Racks	800-050-845
Wall Mount for Envoy with 15”/17” Display, two Module Racks, and Recorder	800-050-835
Wall Mount Upgrade Kits for 800-050-810, or 800-050-815	
Upgrade Kit for mounting two Module Racks without Recorder	800-050-850
Upgrade Kit for mounting one/two Module Racks with Recorder	800-050-855

8.2 Ensemble System - Spare Parts

Spare parts for 5 central station and 20 envoy patient monitors for 5 years.

Item and Description	Part Number (P/N)	Qty
Ensemble Central Station		
Central Station Assembly	555-000-000	
Hard Disk with software installed.	555-101-010	2
Speakers assembly	555-300-010	1
Video PCBA		1
LAN PCBA	146-030-200	1
Service manual	555-opt-012	1
User's Guide	555-opt-014	1
Enscribe Central Recorder		
Recorder Assembly	557-000-000	1
Display (FOR ENVOY OR ENSEMBLE)		
15” Color Display or	935-833-336	4
17” Color Display	554-017-010	4
Envoy Patient Monitor		
Bedside Computer	554-000-000	1
Service Manual	550-opt-012	1
Operation Manual	550-opt-013	1
Main processor board (M.B.)	146-017-060	2
Sound Blaster	146-055-001	2
Fan and Hissing for M.B.	156-554-000	5
32MB DRAM 72 pin EDO	146-020-032	6
Hard Disk with Envoy Software	554-101-010	4
Power Supply	108-020-033	2
Video/Isolation LAN Board	554-202-000	2
PC Comm. PCBA	554-205-000	2
RS232 and splitter	554-201-000	2
Keypad and Flex pcba	554-203-000	2

Item and Description	**Part Number (P/N)**	**Qty**
Keypad Rubber	554-602-000	2
Switch (quick knob)	127-115-500	5
Quick Knob	554-603-000	5
Main fan	554-110-000	5
Speaker and Cable	554-304-016	1
Front Panel	554-601-000	1
Main Harness	554-303-014	2
Cable CPU VGA Video Output	554-305-011	2
Cable, CPU to M.R. 1	550-314-160	4
Cable M.R. 1 to M.R. 2	550-314-011	2
Module Rack Assembly	553-000-000	2
Module Rack without boards (case)	553-000-900	2
ECG Module	551-103-000	3
ECG Module with out boards	551-103-900	2
ECG, Front Panel Assembly	551-691-103	2
Screws for case	134-715-019	5
BP/CO Module	551-107-000	3
BP Module without boards	551-107-900	2
BP/CO, Front Panel Assembly	551-691-107	4
Screws for case	134-715-019	5
NIBP Module	551-130-000	3
NIBP Module without boards	551-130-900	2
NIBP, Front Panel Assembly	551-691-130	2
Etco2 Module	551-133-000	3
Etco2 Module without boards	551-133-900	2
Etco2, Front Panel Assembly	551-691-133	2
Spo2 Module	551-131-000	3
Spo2 Module without boards	551-131-900	2

Item and Description	Part Number (P/N)	Qty
Spo2, Front Panel Assembly	551-691-133	2
Parts and Accessories for Installation		
Ethernet HUB 10 Base-T, 16 Ports, 230V		
Data Wall outlet Single On Gas plate	116-106-037	
Data Wall outlet GTP5, White, Double, Partially External	116-106-032	
Data Wall outlet GTP5, White, Double, Partially Internal	116-106-033	
Data Wall outlet GTP5, White, Single, Partially Internal	116-106-034	
Data Wall outlet GTP5, White, Single, Partially External	116-106-035	
Tool Hand for R11/RJ45	199-195-145	
Box for Hub and installation interface	199-111-027	
Interconnect Cable for LAN Port (pin to pin)	554-314-004 /008/001	
Interconnect cable Envoy w/p	554-314-004	5
4 Pair Cable for Installation	105-020-046	
16 Ports Interface	146-040-130	
RG 58 Coax Cable	105-320-000	
Hand Tool for Wall Plate Installation	199-195-144	
Video Line Driver	960-202-021	

Note: Service Information

Mennen Medical will make available, upon request, circuit diagrams, component parts lists, descriptions, calibration instructions and other instructions which may assist the user's appropriately qualified personnel to repair those parts of the equipment which are designated by the manufacturer as repairable.

Chapter 9

ENSEMBLE - ENGUARD SYSTEM CONFIGURATION

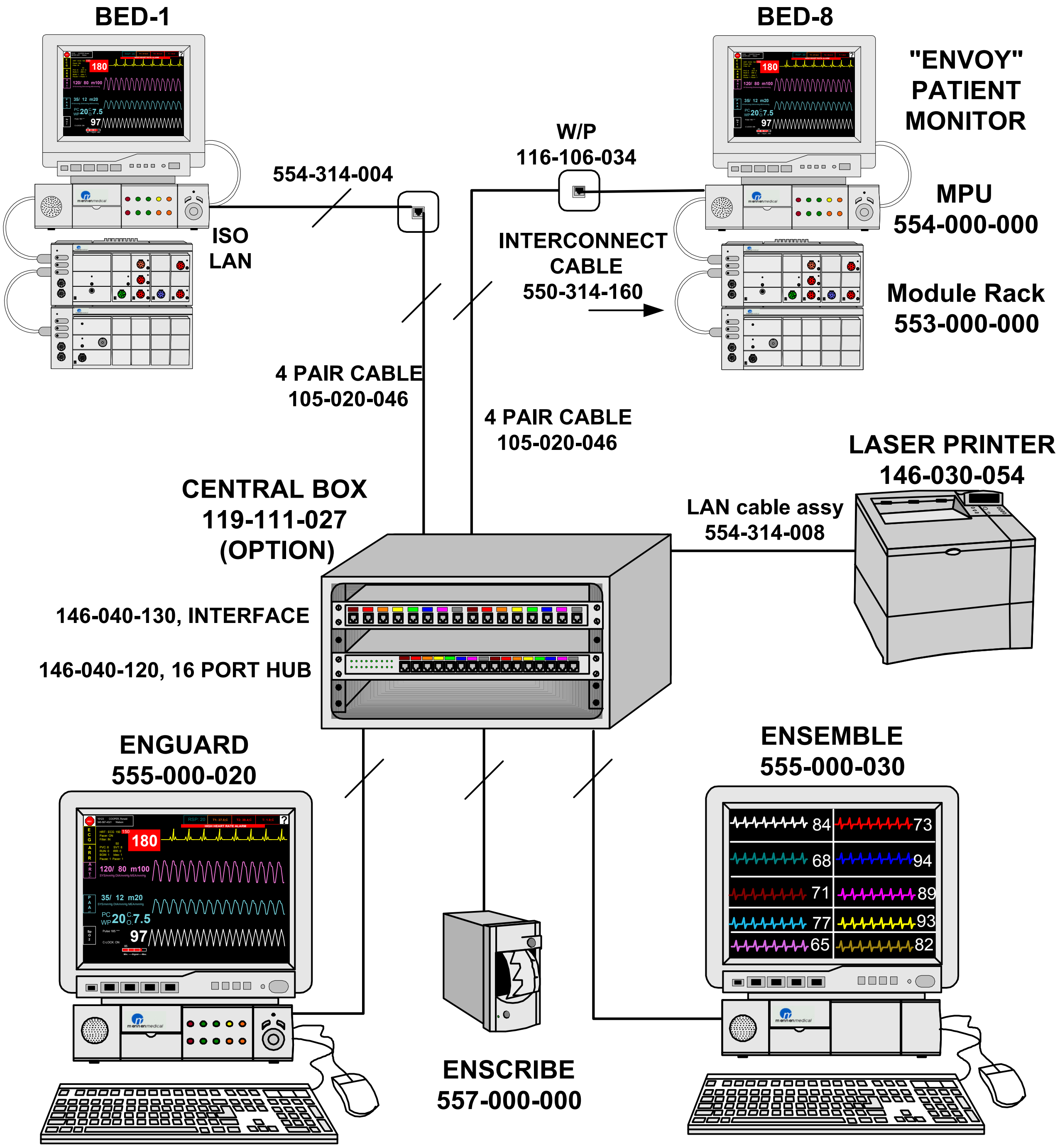
This chapter includes the following sections:

- Overview
- System local setup for software versions V3.0 and up
- System local setup for version V2.4
- Enscribe Recorder
- Laser Printer

9.1 Overview

The ***Ensemble*** and ***Enguard*** systems, the ***Enscribe*** Recorder, and the Laser Printer are described in this chapter. The integration of these items is shown below.

SYSTEM LAYOUT


BED-1
BED-8
"ENVOY" PATIENT MONITOR
W/P
116-106-034
554-314-004
ISO
LAN
MPU
554-000-000
INTERCONNECT CABLE
550-314-160
Module Rack
553-000-000
4 PAIR CABLE
105-020-046
4 PAIR CABLE
105-020-046
LASER PRINTER
146-030-054
LAN cable assy
554-314-008
CENTRAL BOX
119-111-027
(OPTION)
146-040-130, INTERFACE
146-040-120, 16 PORT HUB
ENGUARD
555-000-020
ENSEMBLE
555-000-030
ENSCRIBE
557-000-000

The ***Ensemble*** Central Nurse Station is a PC-based system for central display of up to 12 patients. Depending upon the available screen space, up to 8 waveforms can be displayed per patient. The Ensemble can remotely control certain functions of the bedside monitors and RF Telemetry units. Connection to all monitoring devices is through an Ethernet-LAN. Bedside monitors are hard-wired to the LAN and remain stationary, but may also communicate with mobile telemetry devices. Sections 9.2 through 9.3 describe the system configuration for the ***Ensemble***.

The Mennen Medical ***Enguard*** Station is a PC-based system for central display and interaction with one Envoy patient monitor.

The same MPU, and a choice of 15”, 17”, 18”, or 20” displays are available for the ***Envoy***, ***Ensemble***, and ***Enguard***. The 18” display is a standard, flat-screen monitor. A standard keyboard and serial mouse are used for the ***Ensemble*** and ***Enguard***.

The ***Enscribe*** Recorder and the Laser Printer are described in sections 9.4 and 9.5 respectively.

9.2 System Local Setup For Software Version V3.0 and Up

9.2.1 Overview

System Local Setup enables configuration of global controls, such as setting the alarm and volume controls and network setup for the Multibed. The Multi-bed is configured at the factory with Mennen Medical default values, which can be changed as needed by your hospital or department. Access to the System Local Setup menu is limited to authorized personnel, such as a System Administrator or Hospital Biomedical Engineer possessing a predefined password.

9.2.1 Accessing the System Local Setup Menu

From the System Local Setup menu, you can access the following panels:

- **Store Diagnostic File**

Use this panel to store diagnostic file to be sent to Mennen Medical service department, in case of question.

- **Alarm Volume and Controls**

Use this panel to define general alarm-related parameters, such as alarm volume, color scheme, etc.

- **VS Color Setup**

Use this panel to choose the desired color for the vital signs. The chosen color will be the same for a given VS on all the beds.

- **Network Setup**

  Use this panel to configure devices such as monitors, printers, etc. on the network.

- **Link to Enguard**

  Use this panel to link the Ensemble to an Enguard. Selection of a bed on on the Ensemble will cause the Enguard to link to the selected bed.

- **Inter Unit Privileges**

  Use this panel to define reading and writing privileges for each Central Station on the network.

- **Change Password**

  Use this panel to define a new password for entering the System Local Setup menu.

- **Check Disk**

  Check disk is a technical procedure that does not affect user-defined parameters. This panel is for use by authorized service personnel only.

- **Permission Editor**

  Use this panel to define which Envoy menu options are available for the current Ensemble user.

→ ***To access the System Local Setup menu:***

1. Click the Device name box at the top left corner of the screen. The **Local Setup** panel appears.

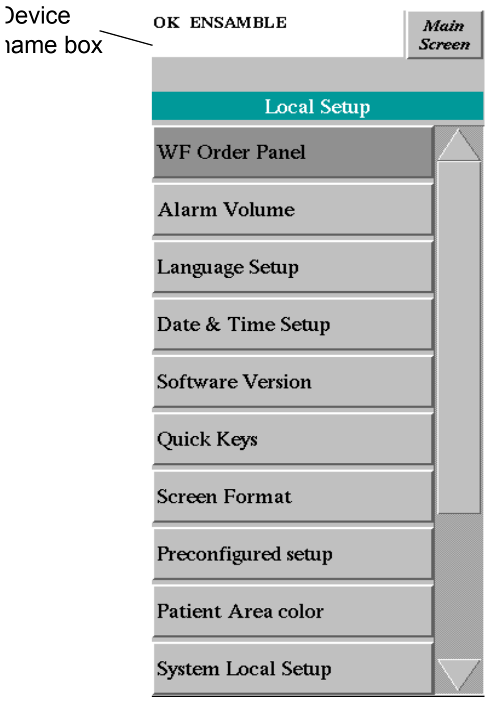
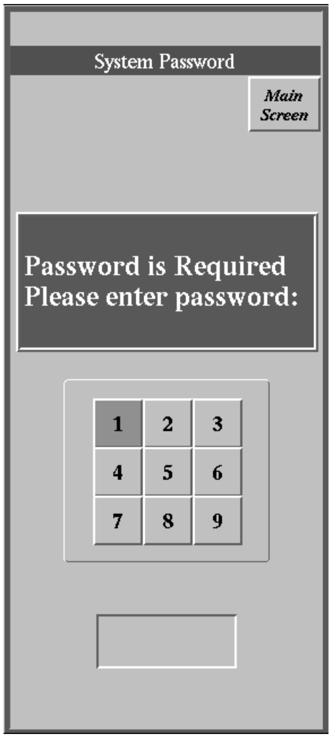

Device
name box
OK ENSAMBLE
Main Screen
Local Setup
WF Order Panel
Alarm Volume
Language Setup
Date & Time Setup
Software Version
Quick Keys
Screen Format
Preconfigured setup
Patient Area color
System Local Setup

Figure 9-1: The Local Setup panel

2. On the menu, choose **System Local Setup**. The **System Password** panel appears requesting the password.


System Password
Main Screen
1
2
3
4
5
6
7
8
9

Password is Required
Please enter password:

Figure 9-2: The System Password Panel

3. Enter the correct password. The **System Local Setup** menu is displayed - see *Figure 4-3* below.

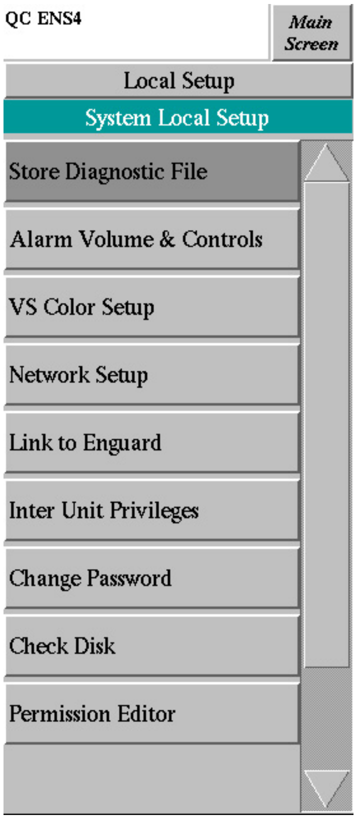
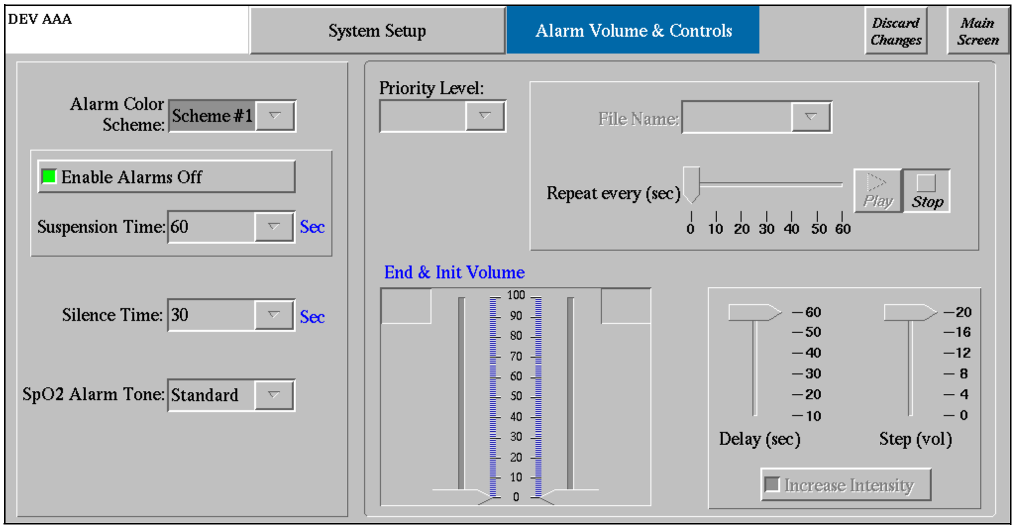

QC ENS4
Main Screen
Local Setup
System Local Setup
Store Diagnostic File
Alarm Volume & Controls
VS Color Setup
Network Setup
Link to Enguard
Inter Unit Privileges
Change Password
Check Disk
Permission Editor

Figure 9-3: The System Local Setup menu

9.2.3 Alarm Volume & Controls

Use this panel to define general alarm-related parameters, such as alarm volume, color scheme, etc. These parameters are defined for each alarm priority level, enabling the alarm response for each alarm priority to be unique. For a more detailed description of Alarms, including alarm priority and notification, refer to Chapter 7, “Alarms”, in the *Envoy Operating Manual*.


DEV AAA
System Setup
Alarm Volume & Controls
Discard Changes
Main Screen
Enable Alarms Off
Priority Level:
File Name:
Repeat every (sec)
0 10 20 30 40 50 60
Play
Stop
End & Init Volume
100 90 80 70 60 50 40 30 20 10 0
60 50 40 30 20 10
Delay (sec)
20 16 12 8 4 0
Step (vol)
Increase Intensity

Alarm Color Scheme: Scheme #1

Suspension Time: 60 Sec

Silence Time: 30 Sec

SpO2 Alarm Tone: Standard

Figure 9-4: The Alarm Volume & Controls Panel

The panel is divided into two major areas. Parameters common to all alarms are located on the left of the panel. These parameters include; **Alarms Tone Off** and **Silence Time**. On the right side of the panel, parameters specific to each alarm priority are set. These fields include; **File Name**, **Repeat Every (sec)**, **End and Init Volume**, **Delay**, **Step** and **Increase Intensity**. These parameters remain disabled until an alarm priority is selected. A description of each **Alarm Volume and Control** panel field follows.

Enable Tones Off

Pressing the **Enable Tones Off** key (green button), enables you to reduce the alarm volume in local setup to 0 and the tone to “Off”. If the **Enable Tones Off** key is not enabled (grey button), then the alarm volume can be set to a minimun level of 1.

Silence Time

When pressed, the **Silence** key terminates any audio alarms active at that moment for a predefined period which you can set under **Silence Time**. The available options are; **30**, **60**, **90**, and **120** seconds. The factory default is **30** seconds.

Alarm Tone Setting

Defines the alarm priority level for which you wish to define alarm volume parameters. The available priority levels are; **C1, C2, C3, C4, T1, T2**, and **SpO2**. When you select an alarm priority level, the following fields are enabled:

- **File Name**

  Defines the .wav file (sound file) which supplies the alarm tone for the selected alarm priority. The available options are; **C1.WAV, C2.WAV, C3.WAV, C4.WAV, T1.WAV, T2.WAV** and **SpO2.WAV**. Each file corresponds to the alarm priority of that name.

- **Repeat Every (sec)**

  Defines the time period after which an alarm is repeated (every 10 seconds, every 20 seconds, etc.). The available options are; **10, 20, 30, 40, 50**, and **60** seconds. You can press the **Play** button to sample the selected alarm tone. The factory default values are as follows:

  - C1, C2, and C3 - 0 seconds
  - T1 - 20 seconds
  - T2 - 30 seconds
  - SpO2 - 60 seconds

Note: *A repeat time of 0 seconds indicates that the alarm tone is continuous.*

- **End and Init Volume**

  Sets the volume of the alarm tone when the alarm is first triggered (Initial Volume) and the maximum volume the alarm can reach until responded to (End Volume). The alarm volume gets progressively louder until it reaches the maximum level then remains at that maximum level until someone responds. **End and Init Volume** is set on a scale of 0-100. Sliders are provided to set the volume. The left slider controls the end (maximum) volume and the right slider controls the init (initial) volume.

- **Delay (sec)**

  Sets the time delay (in seconds) until the alarm increases in volume. **Delay** is set on a scale of 10-60.

- **Step (vol)**

  Sets the increase in alarm volume after each delay. **Step** is set on a scale of 0-20 (in units of 4).

- **Increase Intensity**

  Select this checkbox to enable increase in alarm volume. If this option is disabled, the alarm tone remains at its initial level of volume.

Setting the Alarm Volume & Control Panel

You can access the **Alarm Volume & Controls** panel from the **System Local Setup** menu.

→ ***To set Alarm Volume and Controls:***

1. Select or clear the **EnableTones Off** checkbox, as required.
2. From the **Silence Time** drop-down menu, select the alarm silence time.
3. From the **Priority Level** drop-down menu, select the alarm priority level to be configured.

4. From the **File Name** drop-down menu, select the alarm tone.WAV file for the selected priority level.
5. Set the **Repeat Every (sec)** scale by moving the slider to the required time period. Select **Play** to hear a sample of the alarm tone. Select **Stop** to end the playback of the alarm tone.
6. Under **End and Init Volume**, set the left slider to the maximum alarm volume and the right slider to the initial alarm volume.
7. Set the **Delay** slider to the required delay (in seconds).
8. Set the **Step** slider to the required number of steps for each alarm volume increase.
9. Select the **Increase Intensity** checkbox to activate this function. Clear the checkbox to deactivate.
10. Press **Discard Changes** to close the panel without applying any changes made
    –or–
    press **Main Screen** to apply the changes and exit to the main screen.

9.2.4 Vital Sign (VS) Color Setup

Use this panel to choose the desired color for the supported vital signs.

Note: *Choose the vital sign color before connecting beds.*

After choosing a color for a specific vital sign, the color chosen will be the same for that vital sign in all the monitored beds. e.g. if you choose yellow to display ECG, then the ECG of *all* monitored patients will be displayed in yellow.

→ ***To set VS colors:***

1. Click on the **VS Color Setup** in the System Local Setup Menu - a panel is displayed, showing all the VS colors supported by the Ensemble, including the default colors for each VS.

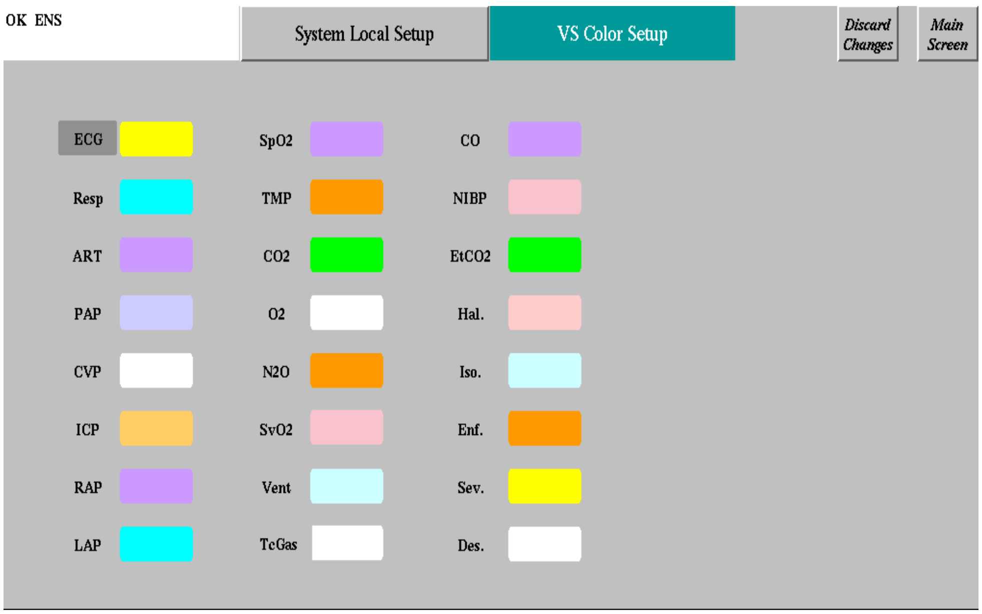

OK ENS
System Local Setup
VS Color Setup
Discard Changes
Main Screen
ECG
Resp
ART
PAP
CVP
ICP
RAP
LAP
SpO2
TMP
CO2
O2
N2O
SvO2
Vent
TcGas
CO
NIBP
EtCO2
Hal.
Iso.
Enf.
Sev.
Des.

Figure 9-5: VS Color Panel

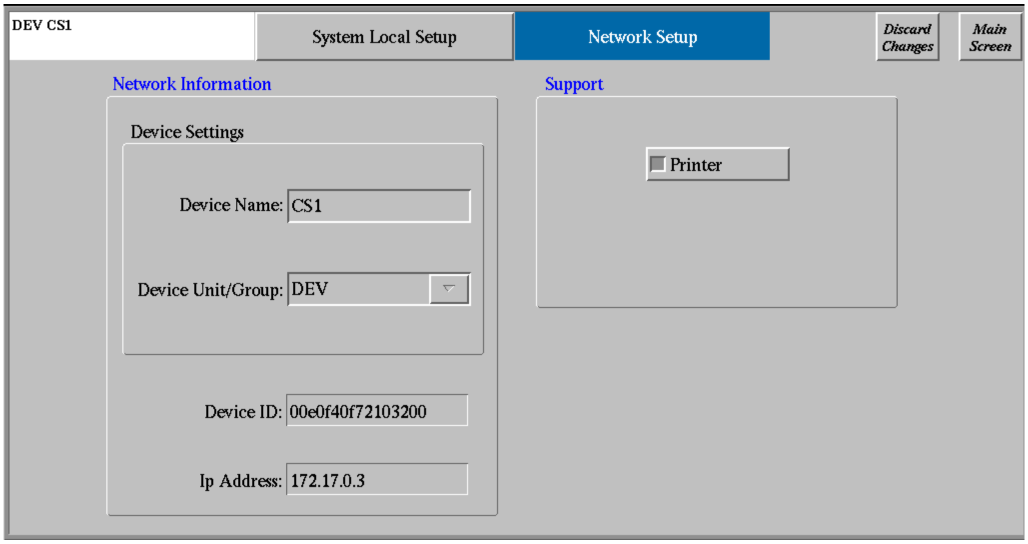
2. Select a VS box - a color table opens.
3. Select the desired color.
4. Repeat the above procedure for all monitored vital signs.
5. Select **Discard Changes** to close the panel without applying any changes,
   –or–
   Select **Main Screen** to apply the changes and close the panel.

9.2.5 Network Setup

The Network Setup panel is used to name a device and to name and define which unit each device is associated with. It also displays the device ID number, and IP address as identified by the system. If a printer is located on the LAN, you can enable the printer.

→ ***To configure Network Setup:***

1. In the System Local Setup menu, click **Network Setup**.


DEV CS1
System Local Setup
Network Setup
Discard Changes
Main Screen
Network Information
Support
Device Settings

Device Name: CS1

Device Unit/Group: DEV

Device ID: 00e0f40f72103200

Ip Address: 172.17.0.3

☐ Printer

Figure 9-6: Setting up the Network

2. Click in the **Device Name** box, and enter the name of the device.
3. Click in the **Device Unit/Group** box, and enter the name of the unit or group.
4. Click the **Printer** checkbox to activate or deactivate the printer.

5. Select **Discard Changes** to close the panel without applying any changes.
   –or–
   Select **Main Screen** to apply the changes and close the panel.

9.2.6 Link to Enguard

When the Ensemble and an Enguard, remote monitor, are of the same UNIT as defined in the Network setup of the Ensemble and the Enguard, it is possible to link the Enguard to the bed that is in focus (yellow frame) on the Ensemble.

➤ ***To activate the Link to Enguard:***

1. Select **System Local Setup (password protected)** in the **Local Setup** menu.
2. Select **Link to Enguard** in the **System Local Setup** menu.
3. On the **Link to Enguard** panel select the Enguard Device Name as defined in the Network setup of the Enguard

From now on, when a bed is selected on the Ensemble it is displayed on the selected Enguard.

➤ ***To deactivate the Link to Enguard:***

- Use **Unlink** key on the **Link to Enguard** panel.

9.2.7 Inter Unit Privileges

Different units located on the same network can be connected to each other.

Each unit's Central Station can interact with monitors of other units. Inter Unit privileges define whether a Central Station in one unit may or may not interact with another unit.

In the Inter Unit Privileges panel you define reading/writing privileges from a Central Station to each of the units connected.

Three options are available:

- **Read** - allows to read parameters, but not to perform any procedures or change parameters on the remote unit.
- **Read/Write** - allows to read parameters, perform monitoring procedures or define settings.
- **N/A** - does not allow reading or writing of parameters.

→ ***To define inter unit privileges:***

1. In the System Local Setup menu, select **Inter Unit Privileges**. The **Inter Unit Privileges** panel opens.

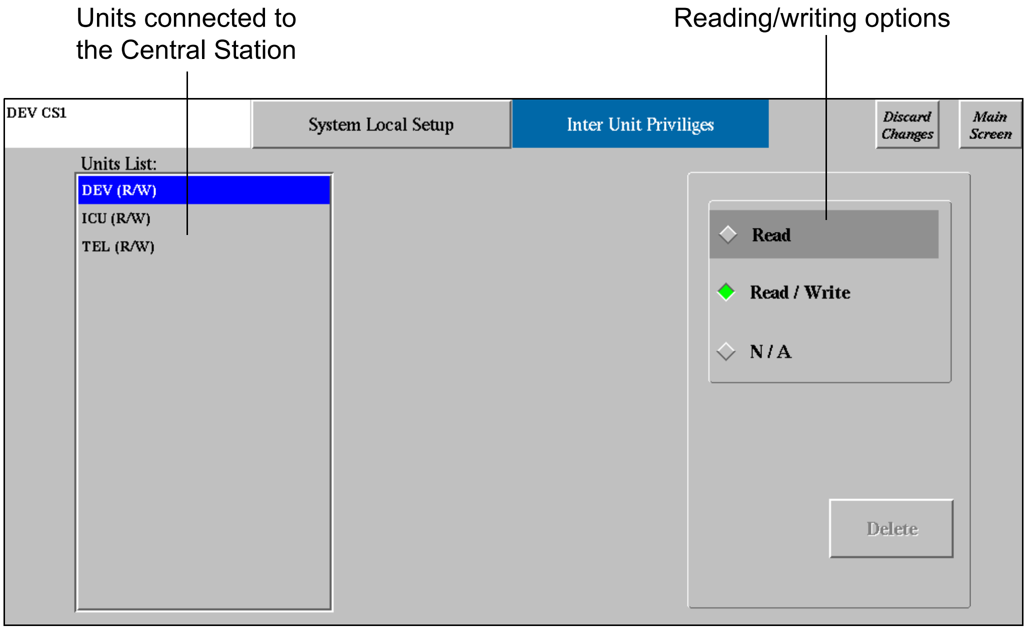

Units connected to the Central Station
Reading/writing options
DEV CS1
System Local Setup
Inter Unit Priviliges
Discard Changes
Main Screen
Units List:
DEV (R/W)
ICU (R/W)
TEL (R/W)
◇ Read
◆ Read / Write
◇ N / A
Delete

Figure 9-7: Setting Inter Unit Privileges

2. Under **Units List**, select the unit to which you want to define privileges.
3. Define reading/writing privileges.
4. Click the **Main Screen** button to apply the changes and exit to the main screen.

9.2.8 Change Password

The Change Password option allows you to change the password that enables access to the System Local Setup menu. Access to the **System Local Setup** menu is limited to authorized personnel, such as a System Administrator or Hospital Biomedical Engineer.

→ ***To change the password:***

In the System Local Setup menu, click **Change Password** .
The **Change Password** panel opens.

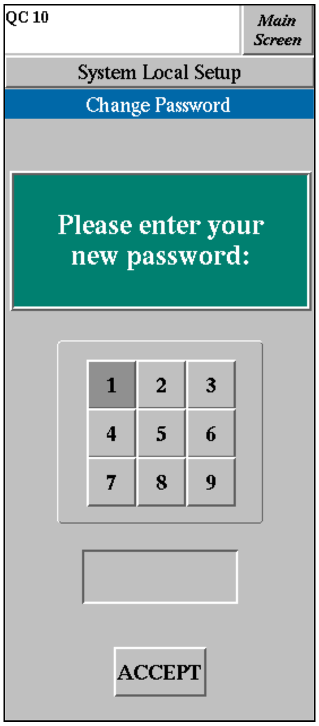

QC 10
Main Screen
System Local Setup
Change Password
Please enter your new password:
1
2
3
4
5
6
7
8
9
ACCEPT

Figure 9 -8: Changing the Password

2. Enter the new password and click **Accept**.
3. A panel appears requesting you to type again the password. Type the password again and click **Accept**.

9.2.9 Check Disk

When running Check Disk, all patient information on the disk is erased.

WARNING!! Avoid using this option.

→ ***To run Check Disk:***

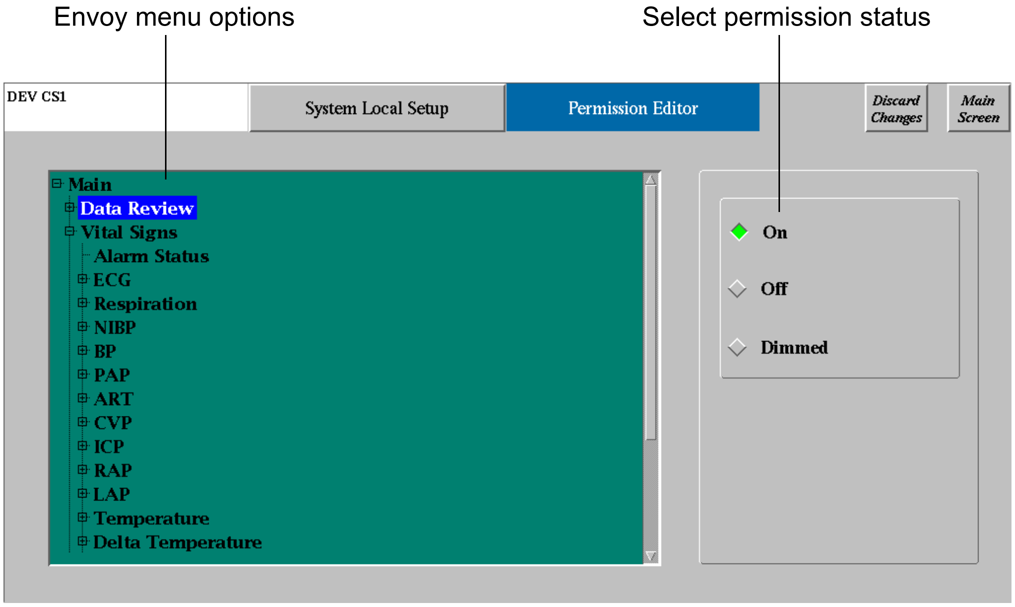
- In the System Local Setup menu, select **Check Disk**.

9.2.10 Permission Editor

In the Permission Editor panel you can define which Envoy/Ensemble functions can be accessed at this Central Station. By default, access to all functions is available at the ***Multi-bed***s. However, you can configure the station to make certain functions unavailable. For example, you can decide that at the current station recording of vital signs data cannot be performed. The Permission Editor displays the entire Envoy/Ensemble menu in tree format, and allows you to define, for each menu option, whether it is available or unavailable for the current Central Station.

The following modes can be set for each menu option:

- **On** - select this checkbox to activate the menu option. The option appears in the appropriate panel and can be accessed.
- **Off** - select this checkbox to remove the menu option from the appropriate panel. The option cannot be accessed.
- **Dimmed** - select this checkbox when you want the menu option to appear dimmed on the panel. The option cannot be accessed.


Envoy menu options

Select permission status

DEV CS1
System Local Setup
Permission Editor
Discard Changes
Main Screen
Main
Data Review
Vital Signs
Alarm Status
ECG
Respiration
NIBP
BP
PAP
ART
CVP
ICP
RAP
LAP
Temperature
Delta Temperature
On
Off
Dimmed

Figure 9-9: The Permission Editor Panel

To define permission for a menu option:

1. From the **Local Setup** menu, select **Permission Editor**. The **Permission Editor** panel appears displaying a menu tree with all Envoy menu options.
2. In the menu tree, click the plus (+) icon that appears to the left of a menu item to access the menu level below that listed on the screen. Any item from any level can be selected when assigning permission.
3. Select the required menu item, and then select the permission status for the item.
4. Repeat steps 3 to 4 until defining permission for all the menu option that you want.
5. Click **Main Screen** to apply changes and close the panel.

➢ ***To access System Configuration***

1. Click the **System Setup** key. The **System Setup** menu appears.
2. From the **System Setup** menu, select **System Configuration**. A message appears requesting the password.
3. Type the correct password and press <ENTER>. The **System Configuration** menu is displayed.

9.3 System Local Setup Configuration For Software Version V2.1n

⚠

Note: *The Ensemble software version V2.1n supports Envoys monitors with software version 2.4K only.*

It is recommended to upgrade the software of the Envoy monitors/Ensemble/Enguard to Version 3.4a.

Call Mennen Medical Service Department for details.

The **System Configuration** menu is **password protected** and can be accessed only by the System Manager. You can configure the System at any time. The ***Ensemble*** comes with a basic configuration which enables the user to operate the system when first started up. The system can be configured to reflect the monitoring practices of the hospital or unit.

The **System Configuration** menu consists of the following panels:

- General Settings
- Date and Time
- ADT Configuration
- Alarm Volume and Controls
- Chart Recording (not currently implemented)
- Screen Configuration
- Patient Areas
- User Defined Keys (UDK) Setup
- Configuration Management (not currently implemented)
- Network Setup
- Security
- Technician
- Configuring Short Cuts

➢ ***To access System Configuration***

1. Click the **System Setup** key. The **System Setup** menu appears.
2. From the **System Setup** menu, select **System Configuration**. A message appears requesting the password.
3. Type the correct password and press <ENTER>. The **System Configuration** menu is displayed.

9.3.1 General Settings

The **General Settings** panel is used to define the following:

- Languages

  Use to set the default language for the system - currently English only.

- Global Messages Time Outs

  Use to determine how long global messages appear on the screen. After the timeout is defined, a global message disappears automatically from the screen after the timeout period has elapsed without any user interaction.

  Global Messages are divided into three categories:

  - **Important**
  - **Normal**
  - **Informative**

- **Units of Measurement Display**

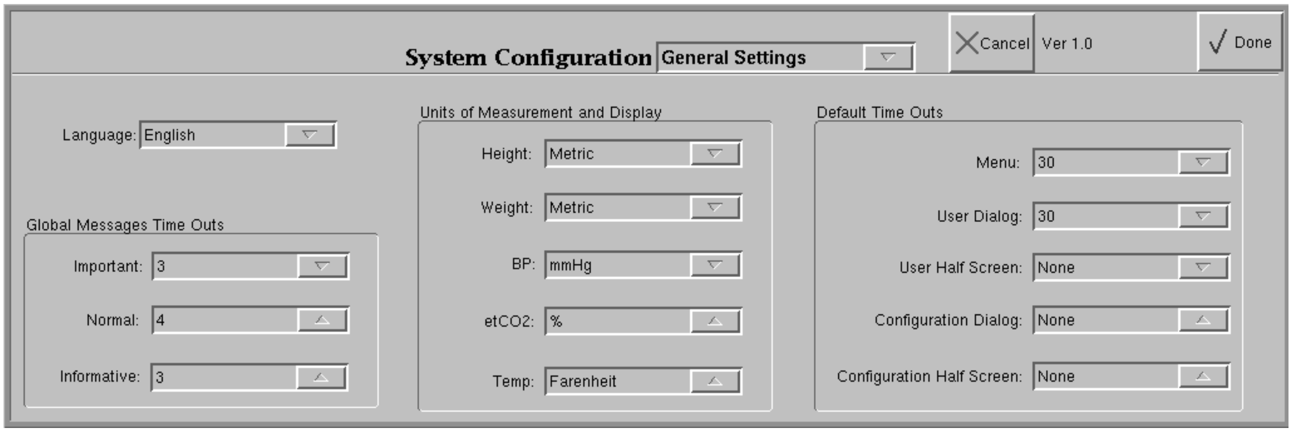
  Use to select the parameters appropriate for the unit. The available options are:

Height	centimeters (cm) or inches (“).
50	
Weight	Kgs. or Lbs.
BP	kPa (kiloPascals), mmHg (millimeters in mercury), or cmH2O (centimeters in water).
EtCO2	percent (%) or mmHg.
Temp	Farenheit or Centigrade.

- Default Timeouts

  Use to determine how long menus, dialog boxes and panels appear on the screen when there is no user interaction. A menu, dialog box or panel disappears from the screen after the timeout period has elapsed.

  Timeouts can be configured for one, two, three, four, and five minutes, and none (meaning that the window remains on the screen until closed by the user).



System Configuration: General Settings

Language: English

Global Messages Time Outs
Important: 3
Normal: 4
Informative: 3

Units of Measurement and Display
Height: Metric
Weight: Metric
BP: mmHg
etCO2: %
Temp: Farenheit

Default Time Outs
Menu: 30
User Dialog: 30
User Half Screen: None
Configuration Dialog: None
Configuration Half Screen: None

Figure 9-10. General Settings Half-Screen Panel

➢ ***To configure General Settings :***

1. From the **System Configuration** menu, select **General Settings**.
2. Under **Language**, select the required language.
3. Under **Global Message Time Out**, select the required timeouts for Important, Normal, and Informative messages.
4. Under **Units of Measurement and Display**, select the required parameters.
5. Under **Default Time Outs**, select the required time outs for each panel type.
6. Click **Done** to apply changes and close the panel

   - or -

   Click **Cancel** to close the panel without implementing any of the changes.

9.3.2 Setting the Date and Time

The date and time configuration options available in **System Configuration** are more advanced than those available in **System Setup**. In the **Date and Time** panel, the System Manager can:

- Set the date and time for the system
- Set date and time formats for the system

9.3.2.1 Setting Date and Time for the Ensemble System

➢ ***To set the date and time:***

1. From the **System Setup** menu, select **Date and Time**. The **Date and Time** panel appears.

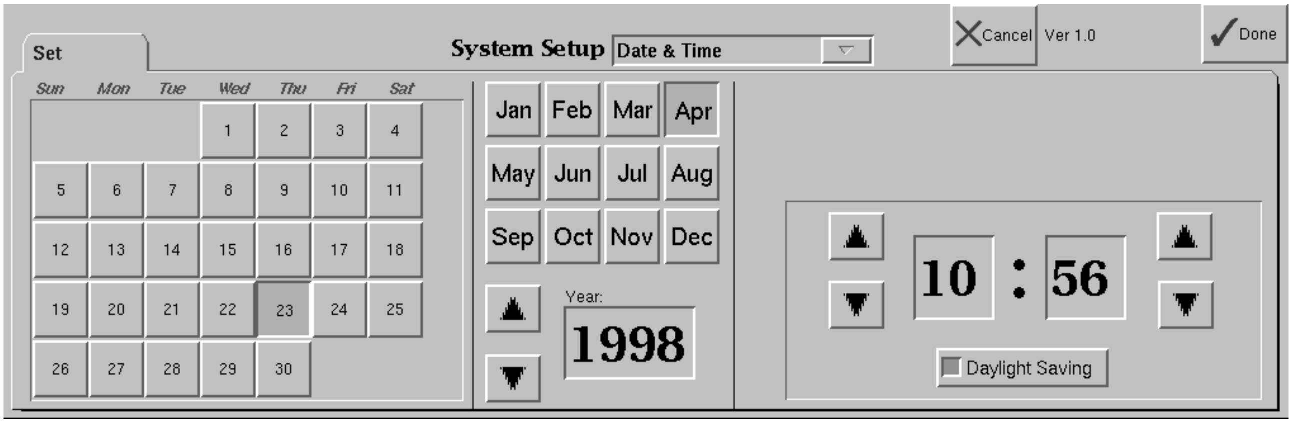

Set
System Setup
Date & Time
Cancel
Ver 1.0
Done
Sun Mon Tue Wed Thu Fri Sat
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30
Jan Feb Mar Apr
May Jun Jul Aug
Sep Oct Nov Dec
Year:
1998
10 : 56
Daylight Saving

Figure 9-11. The Date and Time panel

2. Under **Year**, click on the up or down arrows and select the year.
3. In the calendar, click the buttons for the month and the day of the week.
4. Click the up and down arrows corresponding to the hours and minutes to adjust the time.
5. Select or clear the **Daylight Savings Time** checkbox on the appropriate dates of the year. The ***Ensemble*** automatically adjusts the time.
6. Click **Done** to apply the changes

   or –

click **Cancel** to return to the original setting if you want to repeat the procedure for any reason.

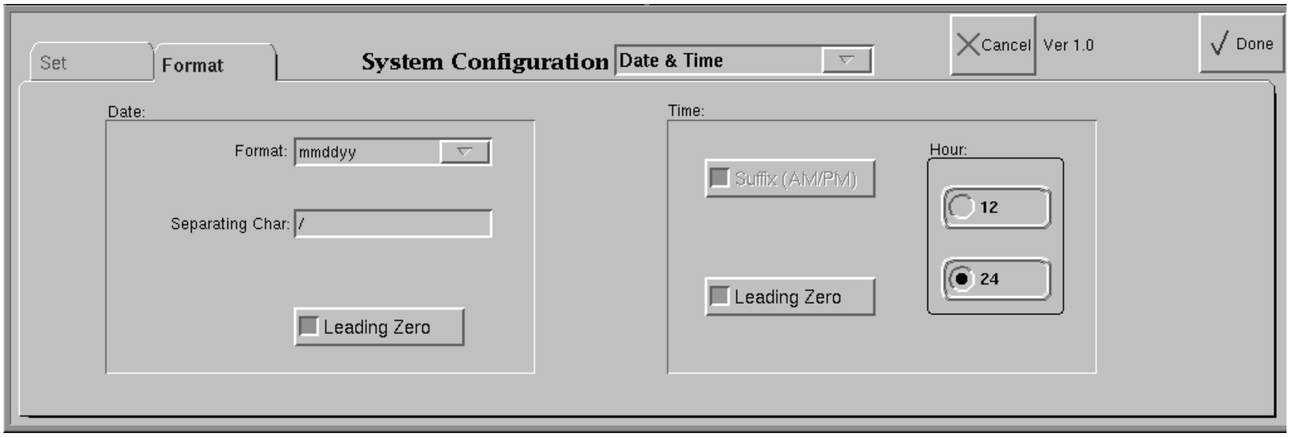
9.3.2.2 *Setting Date and Time Formats*

The System Manager also configures the formats in which the date and time are displayed on screen. This includes:

- Display of the month in numerical form or as a word.
- Display of a leading zero before single-digit months and days (01,02,etc.)
- Display of the time in 12 or 24 hour format.
- What character is used to separate the month, day and year,

➢ ***To set date and time formats:***

1. In the Date and Time panel, click the Format tab.



System Configuration: Date & Time

Date:
Format: mmddyy
Separating Char: /
☐ Leading Zero

Time:
☐ Suffix (AM/PM)
☐ Leading Zero
Hour:
○ 12
● 24

Figure 9-12. The Date and Time panel: Format page

2. From the **Format** list, select the required format for date display.
3. In the **Separating Char** box, type the preferred separating character (such as “/” or “ .”)
4. Under **Time:**
   - Select the hour format (12 or 24-hour day).
   - Select the **Leading Zero** checkbox to activate

   or –

   Clear the checkbox to deactivate display of leading zeroes.

*Note: When a 12-hour clock is selected, the **AM/PM** checkbox is available. Select to display “AM” or “PM” next to the time. Clear the checkbox to deactivate this option.*

5. Click **Done** to apply all changes and close the panel
   or -

   Click **Cancel** to close the panel without implementing any changes.

9.3.3 ADT Configuration

ADT configuration controls how the monitors or telemetry devices are linked to the central station. The System Manager can select from three available options:

- **Admit from Central Station**

When selected, the user can admit a patient from the Central Station as well as from the bedside monitor.

- **Discharge from Central Station**

When selected, the user can discharge a patient from the Central Station as well as from the bedside monitor.

- **Transfer from Central Station**

When selected, the user can transfer a patient from the Central Station as well as from the bedside monitor.

➢ ***To access and set ADT Configuration:***

1. From the System Configuration menu, select ADT Configuration.
2. Select the required checkbox to activate

   – or –

   clear the checkbox to deactivate the option.

9.3.4 Alarm Volume and Controls

Use this panel to control various aspects of alarm functions. The panel has two tabs, **Properties** and **Sounds**.

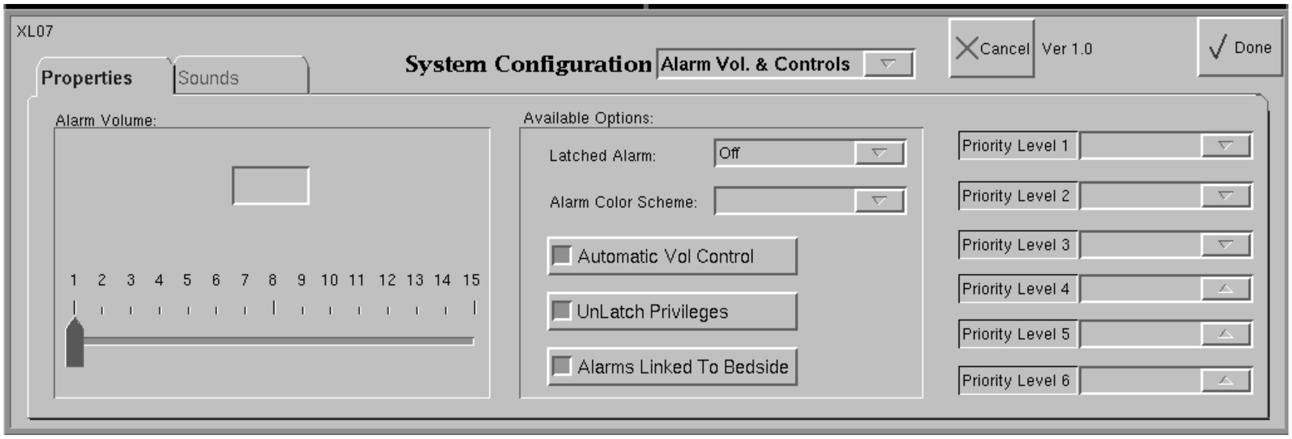
9.3.4.1 Setting Alarm Properties

Use the Properties tab to set the following:

- Alarm Volume - Set on a scale from 1-15.
- Latched Alarm - When this checkbox is selected, the alarm remains active until the user takes some kind of interventive action (initiating alarm silence or alarm suspend) even if the condition which triggered the alarm has resolved itself. There are three options; Off, Visual, and Visual and Audio.
- Off - Turns Latched Alarm off.
- Visual - The visual indication of the alarm remains on screen until Alarm Silence or Alarm Suspend is pressed.
- Visual and Audio - The visual and audio alarms remain active until Alarm Silence or Alarm Suspend is pressed.
- Unlatch Privileges - Controls whether the user can unlatch the alarm from the central station or if this must be done from the bedside monitor.
- Alarms Linked to Bedside - Determines whether the user can control alarms from the central station or from the bedside monitor.
- Automatic Vol Control - Set a minimum volume in the control panel. When Automatic Alarm Control is toggled on, the system adjusts alarm volume according to the ambient noise.

➢ ***To set Alarm Volume and Controls Properties:***

From the System Configuration menu, select Alarm Volume and Controls. The Alarm Volume and Controls panel appears, displaying the Properties page.


XL07
Properties
Sounds
System Configuration
Cancel
Ver 1.0
Done
Alarm Volume:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Available Options:
Alarm Color Scheme:
☐ Automatic Vol Control
☐ UnLatch Privileges
☐ Alarms Linked To Bedside
Priority Level 1
Priority Level 2
Priority Level 3
Priority Level 4
Priority Level 5
Priority Level 6

System Configuration: Alarm Vol. & Controls

Latched Alarm: Off

Figure 9-13. The Alarm Volume and Controls panel: Properties page

Under **Alarm Volume**, move the slider to the required volume,

-or-

In the text box, type the number. The slider jumps to the correct number on the scale.

Under **Available Options**:

- In the Latched Alarm list, select the required setting (Off, Visual or Visual and Audio).
- Select the Automatic Volume Control, Unlatch Privileges, and Alarms Linked to Bedside checkboxes to activate these options. Clear the checkboxes to deactivate.

Click **Done** to apply changes and close the panel.

– or –

Click **Cancel** to close the panel without implementing any of the changes.

9.3.4.2 Setting Alarm Sounds

In the **Sounds** tab, the following options can be configured:

- **Increase Intensity** - Increase alarm intensity by toggling on or off.
- **Delay** - Set a delay (in seconds) after which the alarm intensity increases.
- **Step** - Set the required increase in intensity (these incremental steps are the same as in the alarm volume scale).

➢ ***To set Alarm Volume and Controls sounds:***

1. In the Alarm Volume and Controls panel, click the Sounds tab.

2. Select the Increase Intensity checkbox to activate this option. Clear the checkbox to deactivate.
3. In the Delay list, select the delay time.
4. In the Step list, select the number of steps to increase alarm intensity.
5. Click Done to apply changes and close the panel

– or –

Click **Cancel** to close the panel without implementing any of the changes.

9.3.5 Screen Configuration

The Screen Configuration panel enables the System Manager to control how the display screen is set up and what parameters are displayed. There are four tabs:

- Screen Format
- Device
- Colors
- Parameters

➢ ***To access Screen Configuration:***

- From the System Configuration menu, select Screen Configuration. The Screen Configuration panel opens displaying the Screen Format tab.

9.3.5.1 Selecting the Screen Format

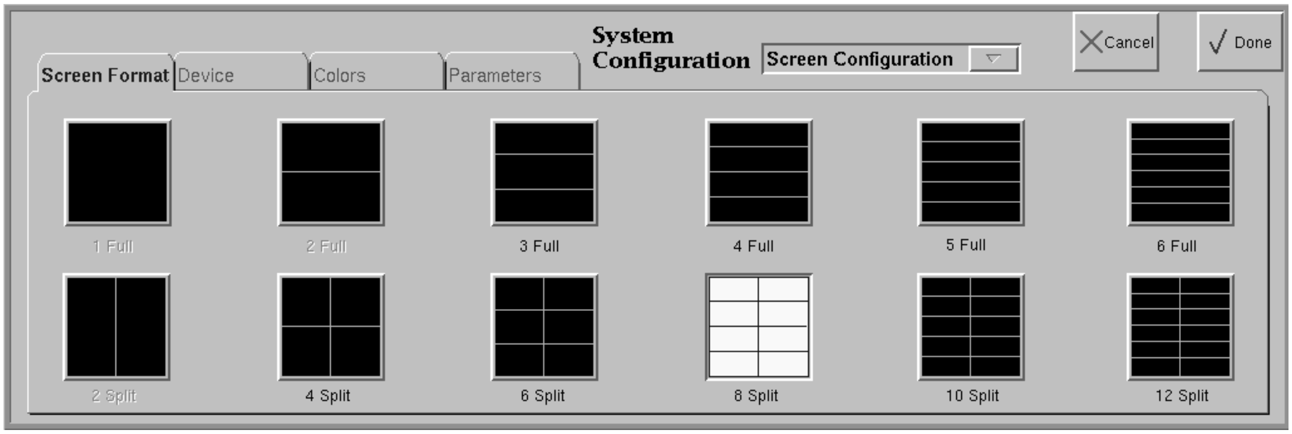

System Configuration
Screen Configuration
Cancel
Done
Screen Format
Device
Colors
Parameters
1 Full
2 Full
3 Full
4 Full
5 Full
6 Full
2 Split
4 Split
6 Split
8 Split
10 Split
12 Split

Figure 9-14. Screen Configuration: Screen Format Tab

In this panel, the System Manager can select the screen display format, from a single patient to the maximum 12-patient, two-column display. The selected format becomes the default. If the system is shut down for whatever reason, when the system is powered on again, it returns to the default configuration.

➢ ***To select a screen format:***

- Click on the required configuration and click Done.

9.3.5.2 Assigning a Device

In the default screen configuration, a bedside device can be permanently assigned toa specific patient area on the screen. When this is configured, a patient admitted at that bedside and connected to the device is automatically admitted at the Central Station as well. Any personal data can be entered in the **Admit** dialog box whenever convenient.

- ***To assign a device to a patient area:***

1. In the **Screen Configuration** panel, click the **Device** tab.

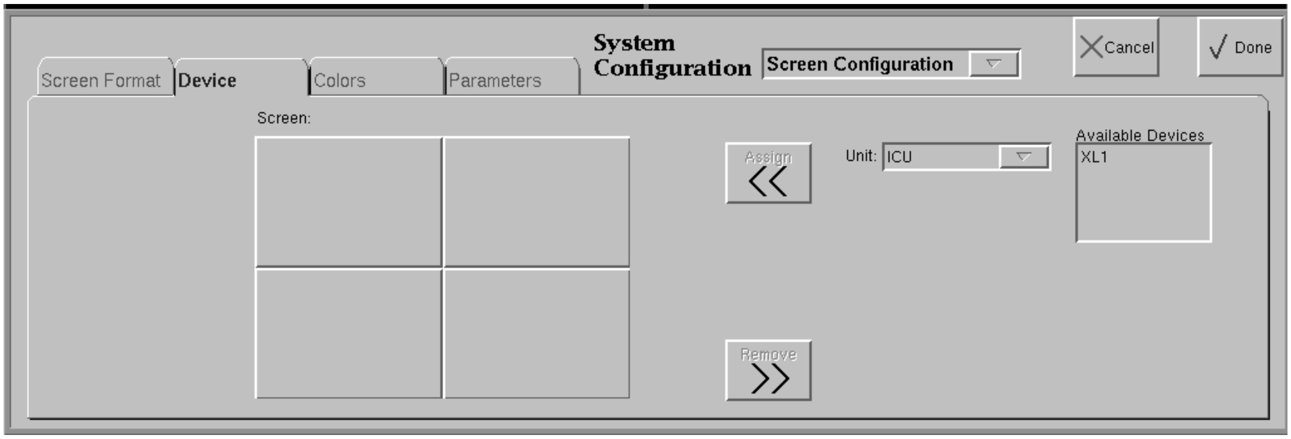

Screen Format
Device
Colors
Parameters
System Configuration
Screen Configuration
Cancel
Done
Screen:
Assign
Unit:
ICU
Available Devices
XL1
Remove

Figure 9-15. Screen Configuration panel: Device tab

2. Under Screen, select the patient area to which you want to assign a device.
3. In the Unit list, select the required unit.
4. In the Available Devices list, select the required device and click Assign to attach the device to the selected patient area.

– or –

Select a patient area and click **Remove** to disconnect the device from the patient area.

5. Click **Done** to apply changes and close the panel

– or –

Click **Cancel** to close the panel without implementing any of the changes.

9.3.5.3 Assigning Colors According To Patient Area

The **Colors** tab of the **Screen Configuration** panel is used to set color according to patient area (there are 16 color choices).

When this option is activated, all vital signs waveforms and values for a specific patient appear in the selected color.

➢ ***To set color according to patient area***

1. In the **Screen Configuration** panel, select the **Colors** tab. Under **Patient Area**s, a graphic representation of the screen format appears with the currently assigned colors.

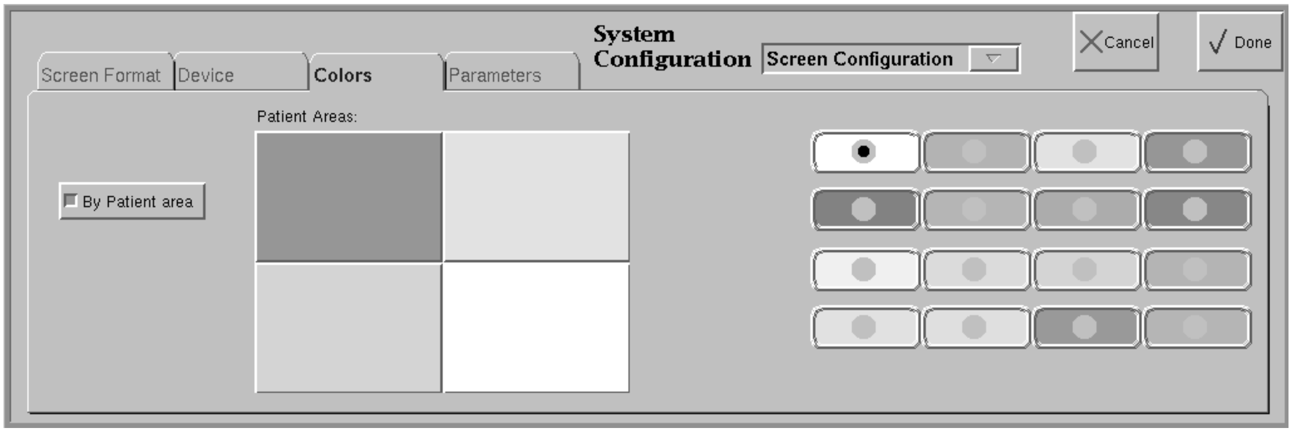


Figure 9-16. The Screen Configuration panel: Colors tab

2. Select the **By Patient Area** checkbox to activate definition of color by patient area.
3. Select a patient area and click the required color.
4. Click Done to apply changes and close the panel

– or –

Click **Cancel** to close the panel without implementing any of the changes.

9.3.5.4 Assigning Colors According to Parameters

Use the **Parameters** tab of the **Screen Configuration** panel to set colors according to each vital sign (parameter). This means that all waveforms of a specific vital sign are displayed in the same color. For example, if all ECG values and waveforms are assigned the color yellow, then ECG waveforms and values for all patients are displayed in yellow on the main screen.

➢ ***To set color according to parameter (vital sign):***

1. In the **Screen Configuration** panel, click the **Parameters** tab.

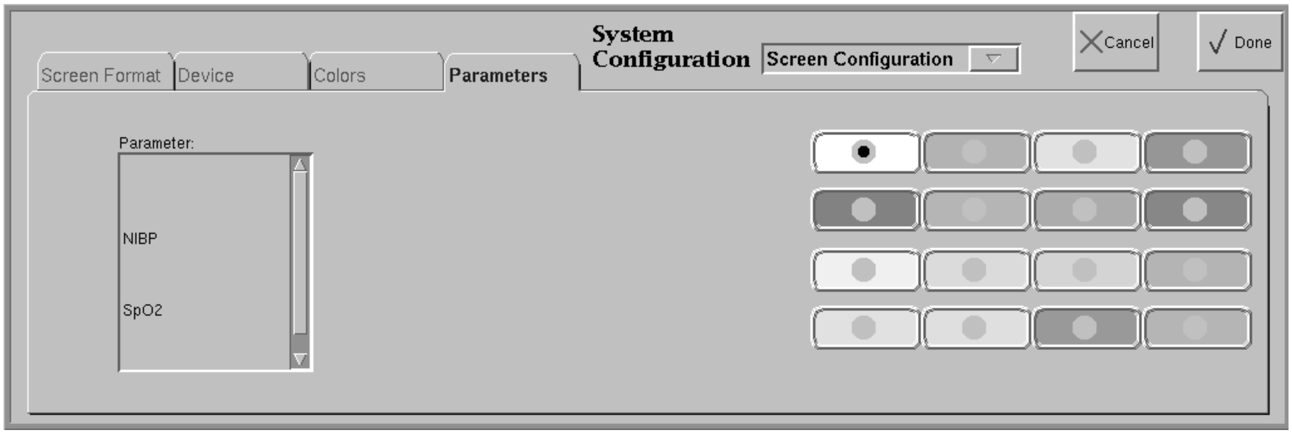

Screen Format
Device
Colors
Parameters
System Configuration
Screen Configuration
Cancel
Done
Parameter:
NIBP
SpO2

Figure 9-17. The Screen Configuration panel: Parameters tab

2. Under **Parameter**, select a parameter (vital sign) and then select the required color.
3. Click **Done** to apply changes and close the panel

or –

Click **Cancel** to close the panel without implementing any of the changes.

Note: The Colors and Parameters functions are mutually exclusive. Color can be assigned to either the patient area or parameter:

9.3.6 *Patient Areas*

This panel is used to define the following default settings for all patient areas:

- Parameters Hierarchy
- Extended Vital Signs Display
- Secondary Vital Signs Area
- Demographic Data Area

➢ ***To access Patient Areas:***

- In the System Configuration menu, select Patient Areas.
  The Patient Areas panel appears displaying the Parameters Hierarchy page. Click on the appropriate tab to open the required page.

9.3.6.1 Setting Parameters Hierarchy

Use this panel to determine the hierarchy of all possible waveforms that can be displayed. It sets the order of appearance of these waveforms on the screen. The panel contains two lists, the **Available Data** list - a list of all the waveforms currently available for display, and the **Displayed Data** list - a list of displayed waveforms. An item from the **Available Data** list can be selected and added to the **Displayed Data** list. Items can also be removed from the **Displayed Data** list. The items in the **Displayed Data** list can be arranged using the **Promote** and **Demote** buttons. The order in which the waveforms appear on this list is the order in which they are displayed on the main screen.

The **Overlapping ECG** function can also be activated. When activated, selected ECG leads appearing on screen are overlapped by five millimeters. This allows a larger display area for the two leads. The ***Ensemble*** can overlap up to three leads.

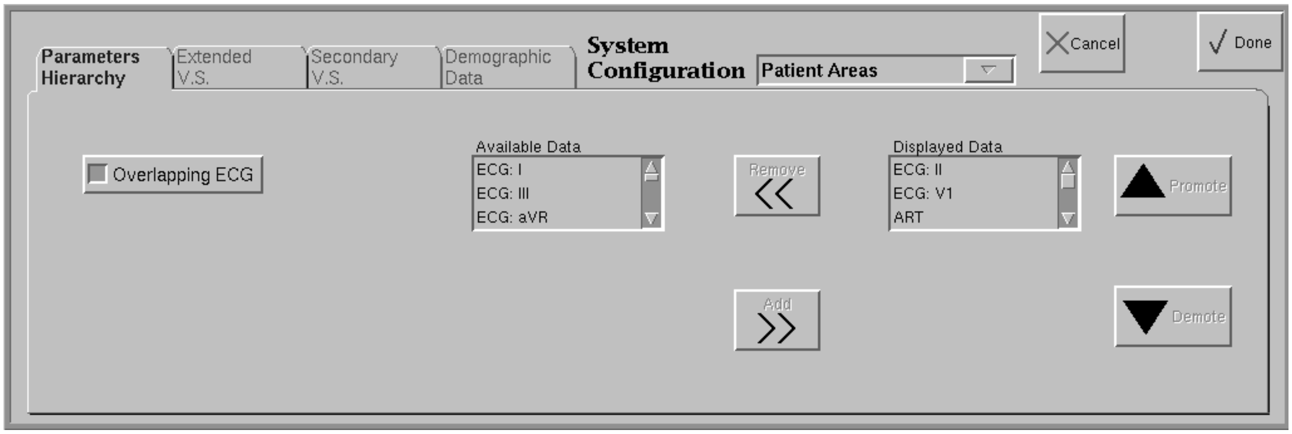

Parameters Hierarchy
Extended V.S.
Secondary V.S.
Demographic Data
System Configuration
Patient Areas
Cancel
Done
☐ Overlapping ECG
Available Data
ECG: I
ECG: III
ECG: aVR
Remove
Add
Displayed Data
ECG: II
ECG: V1
ART
Promote
Demote

Figure 9-18. Patient Areas: Parameters Hierarchy Page

➢ ***To set parameters hierarchy:***

4. Select the **Overlapping ECG** checkbox to activate this option. Clear the check-box to deactivate.
5. In the **Available Data** list, select a waveform and click **Add** to add it to the **Displayed Data** list.
6. In the **Display Data** list, select an item and:
   - Use the **Promote** and **Demote** buttons to place the selected waveform in its required position.
   - Click **Remove** to remove the item from the **Display Data** list and from the on-screen display.
   - Click **Done** to apply changes and close the panel

   -or –

   - Click **Cancel** to close the panel without implementing any of the changes.

9.3.6.2 Extended Vital Signs Display

When the Patient Area is configured for one-column display (up to 6 patients), the Vital Sign area is larger and room is available to display extended vital sign values (for example, ECG can display Arrhythmia and ST data). The **Extended Vital Signs** page works like the **Parameters Hierarchy** page. On the left side of the page, a **Primary Vital Signs** Area appears. This displays which vital sign appears in the **Primary Vital Sign** area on the screen. The **Available Data** list displays a list of all available parameters associated with the primary vital sign. The **Displayed Data** list displays those parameters selected to appear on screen alongside the Primary Vital Sign.

➢ ***To configure the Extended Vital Signs Display:***

1. In the **Patient Areas** panel, click the **Extended V.S**. tab.
2. In the **Primary Vital Sign** list, select the vital sign for which you want to display extended vital signs.
3. In the **Available Data** list, select a parameter and click **Add** to move it to the **Displayed Data** list.
4. Repeat Step 3 until all required parameters are added to the **Displayed Data** list.
5. Select a parameter and click **Remove** to remove it from the **Displayed Data** list.
6. In the **Displayed Data** list, select a parameter and determine its order of appearance on screen by moving it up or down the list with the **Promote** and **Demote** buttons.

7. Repeat Step 6 for each parameter until you have the order you require.
8. Click **Done** to apply changes and close the panel

   -or –

   Click **Cancel** to close the panel without implementing any of the changes.

9.3.6.3 Secondary Vital Signs Area

In this area on the main screen, additional vital sign information which does not fit into the Primary Vital Signs area is displayed in the form of Vital Sign name and numerical value. Use this panel to select the additional vital signs to be displayed and the order in which they appear on the screen.

➢ ***To set the Secondary Vital Signs Area:***

1. In the **Patient Areas** panel, click the **Secondary V.S.** tab. The **Secondary V.S.** page appears.
2. In the **Display** area, select the **VS units** checkbox to display an identifying symbol or measurement unit next to the VS value.
3. In BP Format, select either SYS/DIA or SYS/DIA Mean.
4. In the **Available Data** list, select the vital signs you want to display and click Add to move them to the **Displayed Data** list.
5. In the **Displayed Data** list, select a vital sign and click **Promote** or **Demote** to determine its order of appearance on screen. Repeat for each vital sign until the required order has been obtained.
6. In the **Displayed Data** list, select a vital sign and click **Remove** to remove the item from the on-screen display.
7. Click **Done** to apply changes and close the panel

   -or –

   Click **Cancel** to close the panel without implementing any of the changes**.**

Demographic Data Display

Use the Demographic Data page to determine which parameters appear in the Demographic Data display in the Patient Area on screen. The room number and the patient’s last name always appear on screen. Any other patient data available in the **Admit** dialog box can be selected for on-screen display.

➢ ***To set the Demographic Data Display:***

1. In the **Patient Areas** panel, click the **Demographic Data** tab.
2. In the **Available Data** list, select the parameters required for display.

3. Click **Add** to move the selected parameters to the **Displayed Data** list.
4. In the **Displayed Data** list, select any parameters not required for display and click **Remove** to return them to the **Available Data** list.
5. In the **Displayed Data** list, select a parameter and click **Promote** or **Demote** to determine its order of appearance on screen. Repeat for each vital sign until the required order has been obtained.
6. Click **Done** to apply changes and close the panel

   or –

   Click **Cancel** to close the panel without implementing any of the changes.

9.3.7 User Defined Key (UDK) Setup

User Defined Keys (UDKs) are configurable function keys which can be defined by the user to provide quick access to the most frequently used functions, simplifying work procedures. Any function available on the system can be configured as a function key. When a key is configured for a certain function, the function disappears from its original position and appears as a button on the main screen. In this way, the system conforms to the user rather than the user having to conform to the system. Only the System Manager can assign function keys.

UDKs are defined in the **UDK Setup** panel. When **UDK Setup** is first accessed, the **Patient Setup** and **System Setup** menus appear in the **Menu Tree** area. From this starting point, all menu items in the system can be accessed.

Function keys for monitored vital signs can quickly be defined in the **VS UDK** tab. A VS function key which includes all elements of the Vital Sign menu can be created or a single element can be selected, if that is more useful for your system. Select the required menu item. Any elements under your selection are included in the UDK menu.

For example, if a function key is created for ECG, the default option opens the ECG main menu displaying the three menu choices; **Lead/Gain**, **Alarms**, and **Display Options**. However, the user may have direct access to the **Lead/Gain** and **Alarms** dialog boxes by using an available shortcut so, in this case, it is preferable to select **Display Options** as the Vital Sign function key, enabling quick access to all ECG functions. For more information on shortcuts, see “Configuring Short Cuts” below, in section 9.10.

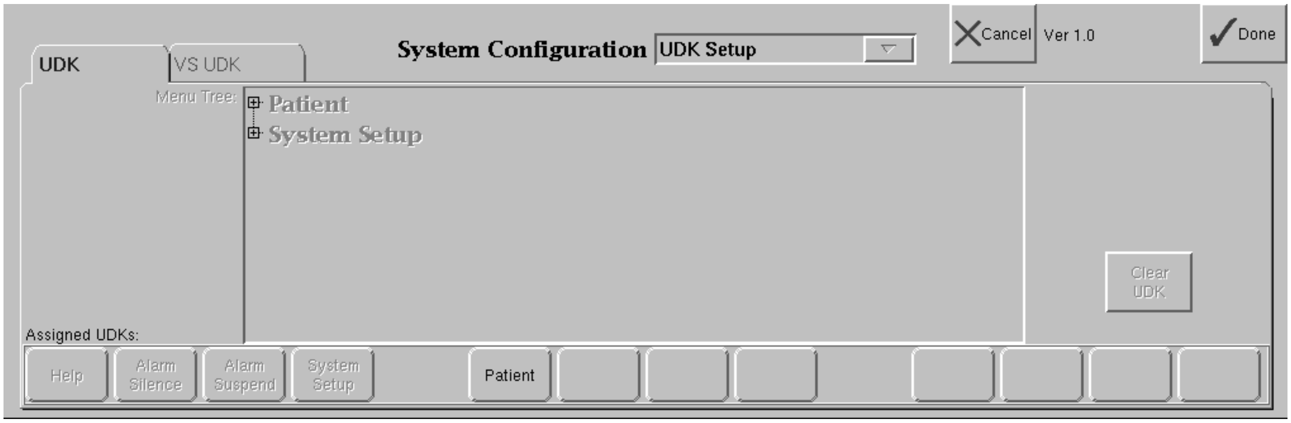


Figure 9-19. System Configuration: UDK Setup page

➢ ***To configure function keys:***

1. From the System Configuration menu, select UDK Setup. The UDK Setup tab appears displaying a menu tree and a graphic representation of the function keys indicating all currently assigned keys.
2. In Menu Tree, click the plus ("+") icon that appears to the left of a menu item to access the menu level below that listed on the screen. Any item from any level can be selected as a UDK.
3. Select the required menu item and click an empty button at the bottom of the panel.
4. Repeat steps 2 and 3 until all required UDKs have been created.
5. Click Done to apply changes and close the panel

   or –

   Click **Cancel** to close the panel without implementing any of the changes.

➢ ***To clear a UDK:***

1. Under **Assigned UDKs**, select the UDK you want to clear.
2. Click **Clear UDK**. The UDK button is now free to be reconfigured.
3. To configure Vital Sign UDKs:
4. In the **UDK Setup** panel, click the **VS UDK** tab. The VS UDK page appears.
5. Under **Vital Signs UDKs**, select the vital sign for which you want to create a UDK. The appropriate vital sign menu tree is displayed.
6. In the **Menu Tree**, click the plus ("+") icon that appears to the left of a menu item to access the menu level below that listed on the screen. Any item from any level can be selected as a UDK.
7. Select the required menu item and click an empty button at the bottom of the panel.
8. Repeat steps 3 and 4 until all required UDKs have been created.
9. Click **Done** to apply changes and close the panel

   -or –

   Click **Cancel** to close the panel without implementing any of the changes.

Note: When the screen is in single column format (the waveform appears across the entire screen), each vital sign on the screen has a Vital Sign UDK.

9.3.8 Setting up the Network

The network information of a selected device can be viewed and modified in the **Network Setup** panel. The device name is entered in the device name area. The Device unit/group identifies the unit in which the device is located. The other fields display information only. The system automatically inserts the data from the device.

➢ ***To access and configure Network Setup:***

1. From the System Configuration menu, select Network Setup.
2. Under Device Name, type in the device name.
3. In the Device Unit/Group list, select the appropriate unit or group. The device ID number, IP address and up time are displayed automatically.
4. Click Done to apply changes and close the panel

   -or –

   Click **Cancel** to close the panel without implementing any of the changes.

9.3.8.1 Security

Presently not active.

9.3.8.2 Technician

Presently not active.

9.3.9 Configuring Short Cuts

On-screen shortcuts to various functions can be activated and deactivated in the Short Cuts panel. The panel is divided into four areas:

- Demographic Area
- Waveform Area
- Primary Vital Signs Area
- Freeze Time Out

Demographic Area - When **ADT** is selected, the shortcut to the **ADT** menu (right-click in the demographic area in the patient area) is activated.

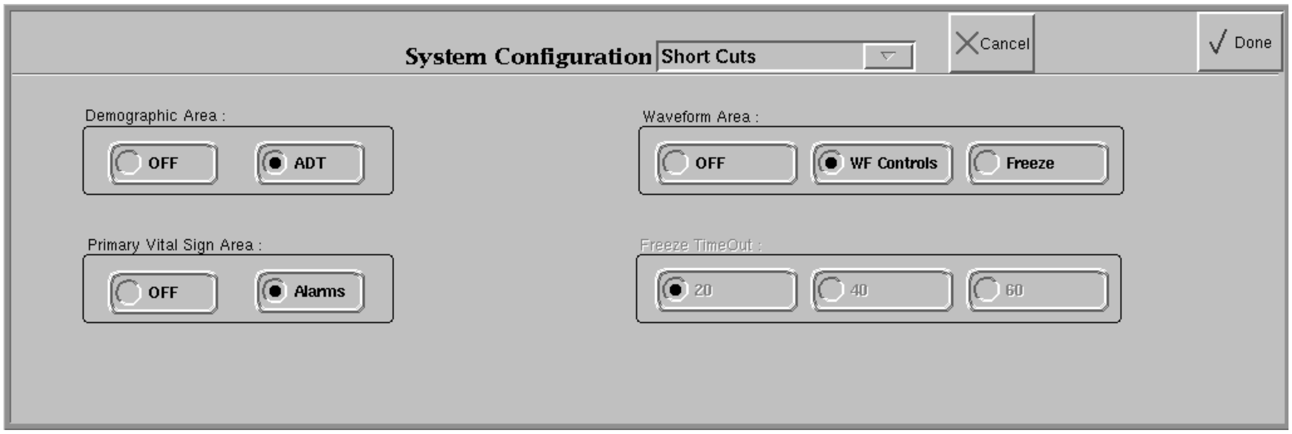
Primary Vital Signs Area - When **Alarms** is selected, the shortcut to the **Alarms** dialog panel (a right-click in the Primary Vital Signs area) is activated.

Waveform Area - There are three options; **WF Controls**, **Freeze** and **Off**. When **WF Controls** is selected, the shortcut brings the user to the appropriate dialog panel. When **Freeze** is selected, a right click in the waveform area freezes the waveform for a configured period of time. **Off** deactivates the shortcut.

Freeze Time Out - Freeze time out is currently configured at 20 sec. The other options are currently not available.

➢ ***To access and set Short Cuts:***

1. In the **System Configuration** menu, select **Short Cuts**.



System Configuration: Short Cuts

Demographic Area : ○ OFF ● ADT

Primary Vital Sign Area : ○ OFF ● Alarms

Waveform Area : ○ OFF ● WF Controls ○ Freeze

Freeze TimeOut : ● 20 ○ 40 ○ 60

Figure 9-20. The Short Cuts panel

2. Under **Demographic** Area, select **ADT** or **OFF**.
3. Under **Primary Vital Signs** Area, select **Alarms** or **OFF**.
4. Under **Waveform** Area, select **WF Controls**, **Freeze**, or **OFF**.

5. Click **Done** to apply changes and close the panel

or –

Click **Cancel** to close the panel without implementing any of the changes.

9.4 ENSCRIBE RECORDER

9.4.1 Enscribe Recorder Unit Overview

This section gives an overview of the *Enscribe* Recorder Unit, henceforth known as the Recorder. Front and Rear Panel views are shown below.

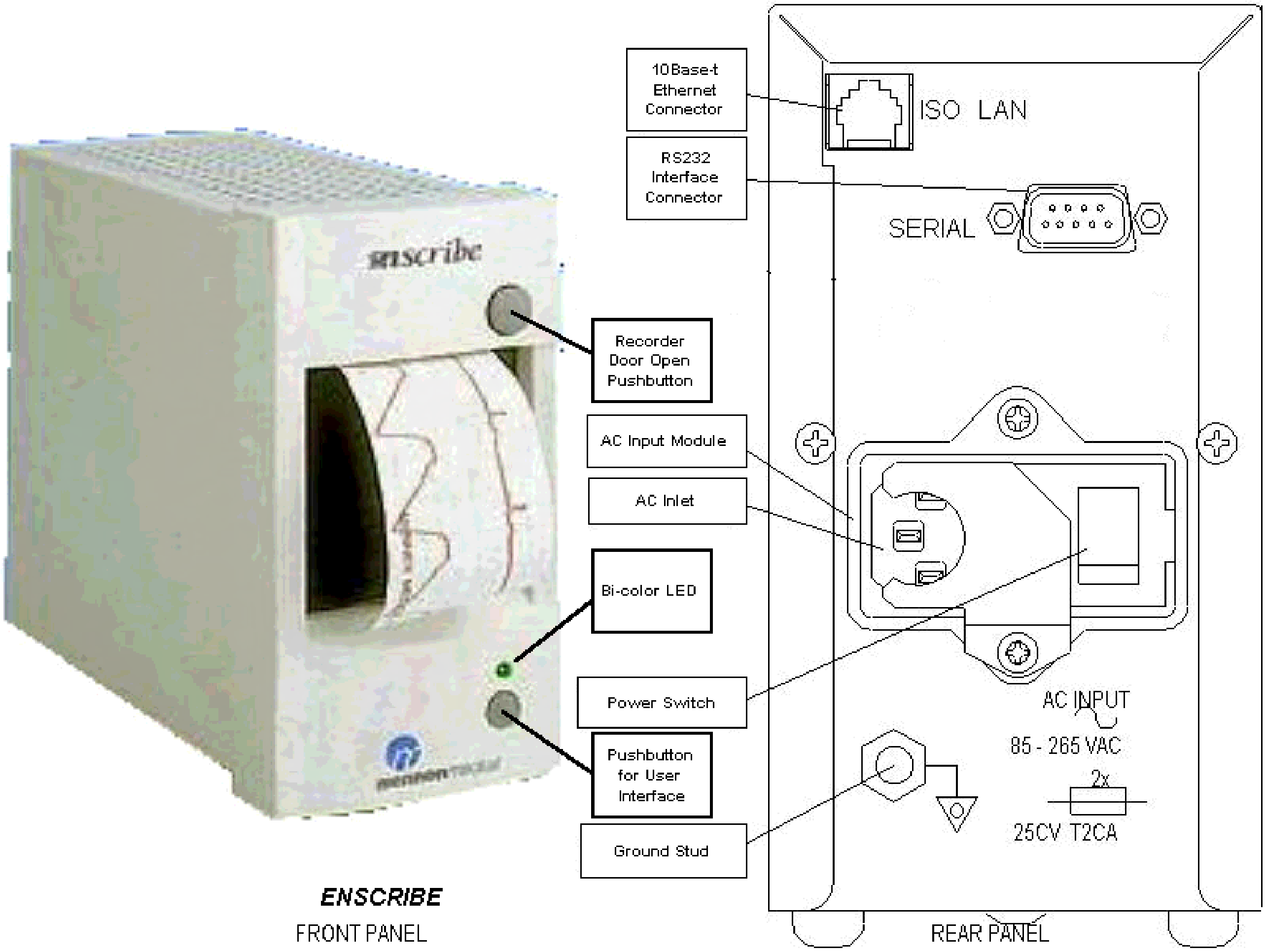

10Base-t Ethernet Connector
RS232 Interface Connector
ISO LAN
SERIAL
enscribe
Recorder Door Open Pushbutton
AC Input Module
AC Inlet
Bi-color LED
Power Switch
Pushbutton for User Interface
Ground Stud
AC INPUT
85 - 265 VAC
2x
25CV T2CA
ENSCRIBE
FRONT PANEL
REAR PANEL

Figure 9-21. Enscribe Recorder – front and rear panels

Recorder main blocks and functions are illustrated with block diagram below.

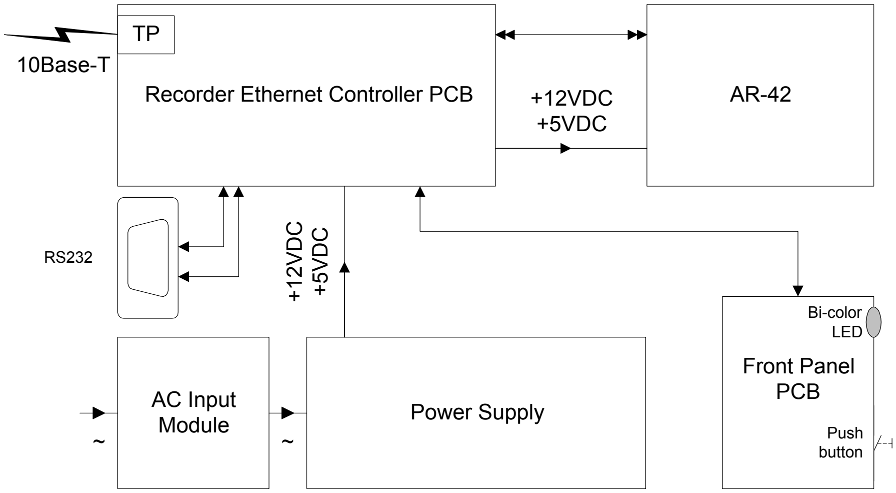


Figure 9-22. "Enscribe" Recorder Unit Block Diagram

The AC power supplied to the Recorder via the AC Input Module, which contains an AC inlet, power switch and two fuses.

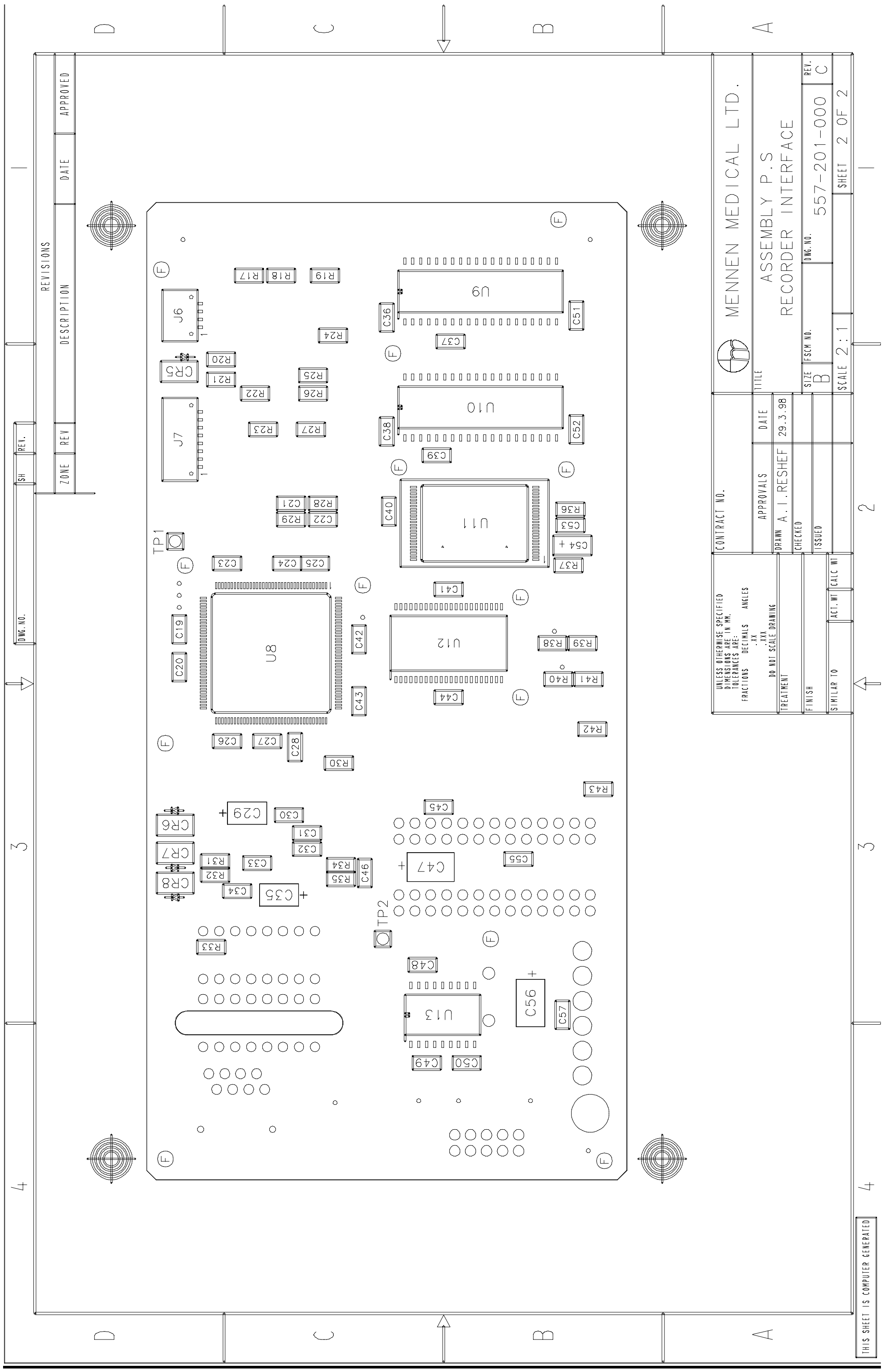
The AC input then comes to the open-frame dual output 40W Power Supply (Power General model MDU2-40-1AD, UL554 medical safety approved) – MM P/N 108-020-022. Power Supply can handle 85-265 VAC Input and has two DC outputs: +5VDC and +12VDC. Both DC outputs of Power Supply are connected directly to the Recorder Ethernet Controller PCB. Power to the AR-42 Thermal Array Recorder supplied via the Recorder Ethernet Controller. Power supply requirements are listed below:

- Power Supply AC input voltage is 85-265 VAC single phase.
- Power Supply DC outputs are +5 VDC and +12 VDC with tolerance 1%.
- REC power consumption is 500 mA typical, 700 mA max. at 5VDC.
- AR42 power consumption as specified in the “AR-42 Specification” is 50 mA typical, 100 mA max. at 5 VDC and 400 mA typical at 12 VDC.

The Recorder Ethernet Controller (REC) PCB contains an Integrated Multiprotocol Processor with Ethernet MC68EN302 performs the controls and communications interface. This PCB provides a Twisted Pair (TP) Ethernet connection. In addition to an Ethernet connection, two serial channels with RS232 interface on a single 9-pin D-type connector are also provided for program download and debugging purposes.

REC PCB Assembly. Mennen Medical part number 557-201-000. Current revision “Rev. –“.
REC PCB Schematic Diagram. Mennen Medical part number 557-201-200. Current revision “Rev. --“.

The Print and Circuit sides of the REC PCB are shown below.


MENNEN MEDICAL LTD.
ASSEMBLY P.S
RECORDER INTERFACE
DWG. NO. 557-201-000
REV. C
SHEET 2 OF 2
SIZE B
SCALE 2:1
DRAWN A.I.RESHEF 29.3.98
REVISIONS
ZONE
REV
DESCRIPTION
DATE
APPROVED
CONTRACT NO.
APPROVALS
DATE
CHECKED
ISSUED
TREATMENT
FINISH
SIMILAR TO
ACT. WT
CALC WT
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM. TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX .XXX
DO NOT SCALE DRAWING
THIS SHEET IS COMPUTER GENERATED
A
B
C
D
1
2
3
4
U8
U9
U10
U11
U12
U13
J6
J7
TP1
TP2
CR5
CR6
CR7
CR8
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C30
C31
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C48
C49
C50
C51
C52
C53
C54
C55
C56
C57
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42
R43
F

Figure 9-23. REC PCB Print Side Assembly

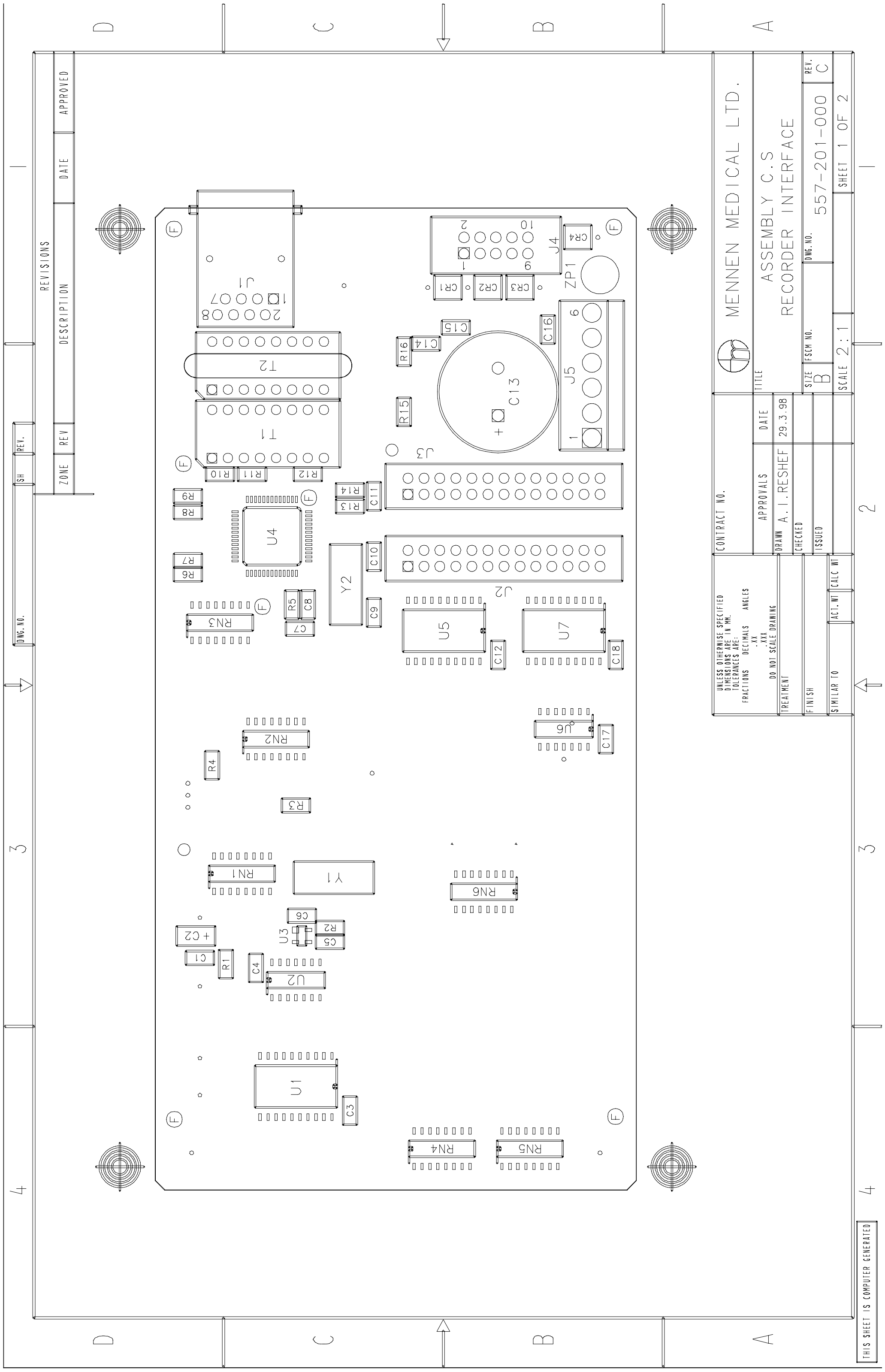

MENNEN MEDICAL LTD.
ASSEMBLY C.S
RECORDER INTERFACE
DWG. NO. 557-201-000
REV. C
SHEET 1 OF 2
SIZE B
SCALE 2:1
DRAWN A. I. RESHEF
DATE 29.3.98
CONTRACT NO.
APPROVALS
CHECKED
ISSUED
TITLE
FSCM NO.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM. TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX .XXX
DO NOT SCALE DRAWING
TREATMENT
FINISH
SIMILAR TO
ACT. WT
CALC WT
THIS SHEET IS COMPUTER GENERATED
REVISIONS
ZONE
REV
DESCRIPTION
DATE
APPROVED
SH
REV.
DWG. NO.
A
B
C
D
1
2
3
4
J1
J2
J3
J4
J5
T1
T2
U1
U2
U3
U4
U5
U6
U7
Y1
Y2
ZP1
RN1
RN2
RN3
RN4
RN5
RN6
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
CR1
CR2
CR3
CR4
F

Figure 9-24. REC PCB Component Side Assembly

The table below specifies the location of major functional blocks of the REC.

Function	RefDes	Schematic Diagram		Assembly	
		Sheet	Location	Site	Location
IMP Status LED	**CR5**	**1**	**B1**	**PS**	**D2**
EEIT Status LEDs	**CR6-8**	**2**	**B2**	**PS**	**D3**
10Base-T Connector	**J1**	**2**	**C2**	**CS**	**C1**
AR42 Connectors	**J2-3**	**1**	**D2-4**	**CS**	**B-C2**
RS232 Connector	**J4**	**2**	**C3**	**CS**	**B1**
Power Connector	**J5**	**1**	**D2**	**CS**	**B1**
Front Panel Connector	**J6**	**1**	**D1**	**PS**	**D1**
JTAG Connector	**J7**	**1**	**C3**	**PS**	**D2**
10Base-T Filter Module	**T1**	**2**	**C2**	**CS**	**C2**
Isolation Transformer	**T2**	**2**	**C2**	**CS**	**C2**
RS232 Transceiver	**U1**	**2**	**C2-3**	**CS**	**C4**
Program Flash	**U11**	**1**	**B3**	**PS**	**V2**
Static RAM	**U12**	**1**	**B1-2**	**PS**	**C-B2**
Ethernet Transceiver	**U4**	**2**	**A-B2**	**CS**	**C2**
IMP	**U8**	**1**	**C1-3**	**PS**	**C2**
Dynamic RAM	**U9-10**	**1**	**B3-4**	**PS**	**B1-2**
IMP Crystal	**Y1**	**1**	**C3**	**CS**	**C3**
EEIT Crystal (optional)	**Y2**	**2**	**A3**	**CS**	**C2**

Table 9-1: Major component locations on REC PCB

AR-42 Thermal Array Recorder. The AR-42 is a 48mm thermal array recorder that can print waveforms, text and graphics. Users can print complex graphic images or digitized waveforms, with text, on standard or customized grids – all on 50mm roll paper. The AR-42 combines unique curve-smoothing software with a resolution of up to 200 x 800 dots per inch (8 x 32 dots per mm) to produce crisp, clear images.

Front Panel (FP) PCB is a small printed circuit board containing a bi-color LED that indicates Recorder status and a push button for user interface.

PCB Assembly. Mennen Medical part number 557-202-000. Current revision "Rev. –".
PCB Schematic Diagram. Mennen Medical part number 557-202-200. Current revision "Rev. --".

The figure below shows the Front Panel (FP) PCB assembly.

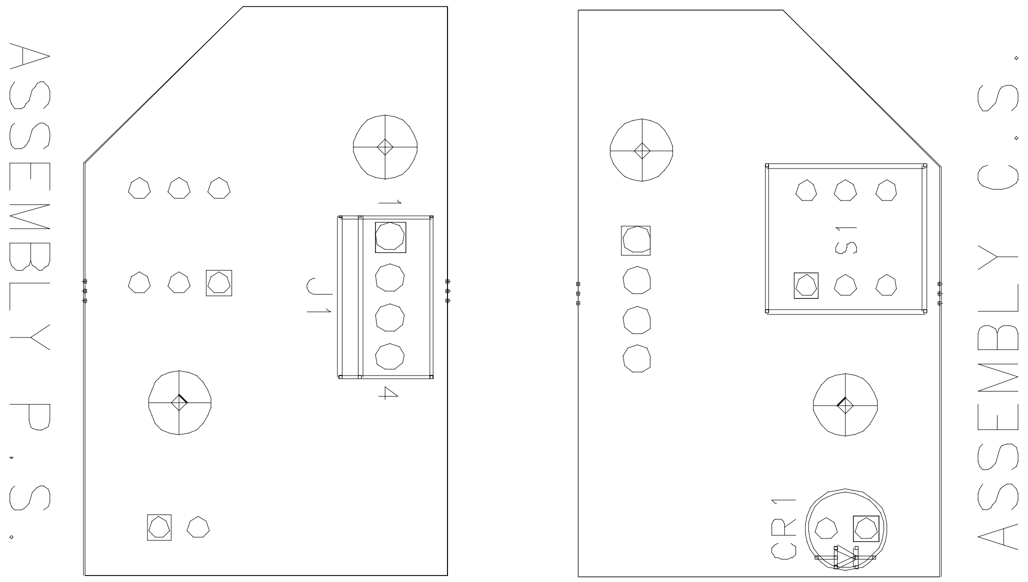


Figure 9-25. Front Panel (FP) PCB Assembly

9.4.2 Block Diagram Description

The following section briefly describes each functional block in the *Enscribe* Recorder Unit. The block diagram below illustrates the main functions of the Recorder Ethernet Controller Board (REC). Note: a tilde (~) prefix to a signal name means that the signal is active LOW; eg., ~CSO is active in the Logic LOW state.

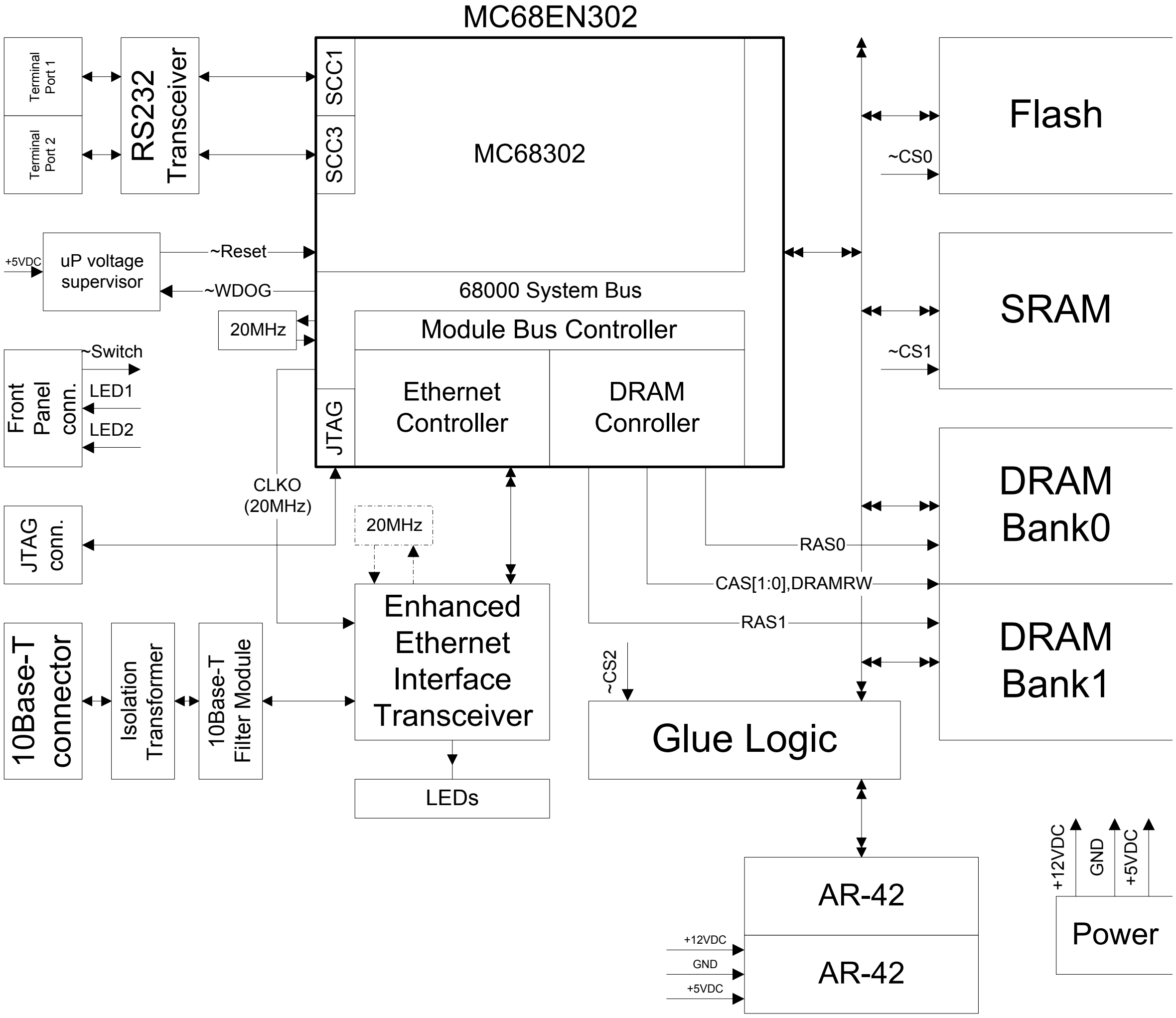

MC68EN302
Terminal Port 1
Terminal Port 2
RS232 Transceiver
SCC1
SCC3
MC68302
+5VDC
uP voltage supervisor
~Reset
~WDOG
20MHz
68000 System Bus
Module Bus Controller
~Switch
Front Panel conn.
LED1
LED2
JTAG
Ethernet Controller
DRAM Conroller
CLKO (20MHz)
JTAG conn.
20MHz
Enhanced Ethernet Interface Transceiver
10Base-T connector
Isolation Transformer
10Base-T Filter Module
LEDs
Flash
~CS0
SRAM
~CS1
DRAM Bank0
RAS0
CAS[1:0],DRAMRW
RAS1
DRAM Bank1
~CS2
Glue Logic
AR-42
AR-42
+12VDC
GND
+5VDC
+12VDC
GND
+5VDC
Power

Figure 9-26. Recorder Ethernet Controller Board (REC) Block Diagram

9.4.3 IMP

The REC design is based on the Motorola MC68EN302 Integrated Multiprotocol Processor (referred to as IMP) that integrates a high-speed M68000 processor with multiple communications peripherals, Ethernet and DRAM controllers.

The MC68EN302 is a multiprotocol integrated communications controller containing an Ethernet controller that is completely independent of the three on-board serial channels as well as containing DRAM control and a JTAG interface

The Ethernet controller provides a 16-bit interface and provides complete IEEE 802.3 compatibility.

The DRAM controller is based upon other 300 family memory controllers with specific enhancements provided for supporting parity and external bus masters.
The JTAG interface is the standard IEEE1149.1 test interface.

9.4.4 LED

The front panel LED provides the following indications:

Green - Enscribe ready for operation

Blinking Green - Enscribe receiving data

Red - Door is open, paper out, recorder initializing

Extinguished - Enscribe is off

9.4.5 Clocking

The MC68EN302 uses a 20MHZ clock. The clock output (CLKO) from the IMP is provided to the MC68160 Ethernet Transceiver.

9.4.6 Microprocessor Supervisory Circuit

The MAX812 is a low power microprocessor supervisory circuit used to monitor the +5VDC power supply. The device performs a single function: it asserts a reset signal whenever the +5VDC supply voltage falls below a preset threshold (4.63 ± 0.12 VDC), keeping it asserted for at least 140ms after the supply voltage has risen above the reset threshold.

A manual reset input pin (~MR) on the MAX812 is connected to the ~WDOG output of the MC68EN302. The ~MR minimum pulse width is 10µs, but the ~WDOG pulse width is 16 master clock periods (e.g. 16/25MHz = 0.64µs). In order to expand the ~WDOG pulse a 5.6pF capacitor was added to the ~MR input. It is possible to disable the watchdog reset (e.g. for debugging purposes) by removing a 0Ω jumper resistor between the ~WDOG output and the ~MR input.

In addition to ~WDOG, the manual reset of MAX812 may be initiated by an external reset from EXT_RST on the JTAG connector.

9.4.7 Memory

The REC provides a place to install 1Mbit (64k × 16bit words), 2Mbit (128k × 16bit words), 4Mbit (256k × 16bit words) or 8Mbit (512k × 16bit words) Flash EPROM for program code storage. Program Flash has a 16-bit wide data bus, allowing word-wide read and write operations. The READY/~BUSY output of flash device is connected to PB5 I/O port of IMP to support a hardware method for detection of

program or erase cycle completion. The IMP ~RESET signal is
connected to the flash device ~RESET pin.
This will reset flash device internal state machine to the read mode
while system reset occurs. ~CS0 is used to select program flash.

The SRAM has a 16-bit wide data bus that allows word-wide read and write operations. The ~LDS and ~UDS signals are used to qualify whether to write the particular data word. ~CS1 is used to select static RAM.

The REC contains two Dynamic RAM (DRAM) banks containing 512kB each (256k × 16bit words). Either or both DRAM banks may be installed on the REC PCB. SRAM has a 16-bit wide data bus that allows word-wide read and write operations. Signals ~RAS0 and ~RAS1 select Bank0 and Bank1, respectively. Signals ~CAS0 and ~CAS1 define lower and upper bytes of the word. ~CAS0 corresponds to the upper byte (data pins D15-D8) and ~CAS1 corresponds to lower byte (data pins D7-D0). Assertion of ~DRAMRW signal signifies that a DRAM write cycle is occurring. Communication

9.4.8 10BASE-T Twisted Pair Interface

The Ethernet communication may use one of two possible media connections: IEEE 802.3 Access Unit Interface (AUI) or 10BASE-T Twisted Pair (TP) Interface.

The MC68160 Enhanced Ethernet Interface Transceiver (EEIT) is a BiCMOS device which supports both IEEE 802.3 Access Unit Interface (AUI) and 10BASE-T Twisted Pair (TP) Interface media connections through external isolation transformers. It encodes NRZ data to Manchester data and supplies the signals which are required for data communication via the 10BASE-T or AUI interfaces. The MC68160 gluelessly interfaces to the Ethernet controller contained in the MC68EN302 device. Prior to twisted pair data reception, Smart Squelch circuitry qualifies input signals for correct amplitude, pulse width, and sequence requirements.

The MC68160 differential outputs are low impedance voltage sources. Therefore, external series resistors must be used in order to match the characteristic impedance of the twisted pair. Since the output resistance of each leg of the transmitter is about 10Ω, a 39Ω resistor is used. So the impedance presented from the source to the isolation transformer is then very nearly 100Ω.

A 10BASE-T Filter Module T1 (FL1066) provides transmit and receive filtering, 2000 VAC isolation and high frequency common-mode noise rejection.

A pulse transformer T2, with turns ratio of 1:1, is inserted between T1 and 10BASE-T connector J4 to provide electrical isolation for LAN connection. This is to meet requirements of IEC601-1 Standards of electrical isolation. The specification set is a high potential voltage of 5kVrms.

9.4.9 RS232

Besides the Ethernet communication channel REC has two RS232 terminal ports those may be used as alternate communication line and for debugging purposes. IMP’s SCC1 and SCC3 are utilized for this intend.

The RS232 Transceiver (ADM242) is a high speed RS-232 line driver/receiver offering transmission rates up to 200 kB/s. Operating from a single +5 V power supply, a highly efficient on-chip charge pump using small (0.1 uF) external capacitors allows RS-232 bipolar levels to be developed. Two RS-232 drivers and two RS-232 receivers are provided on the device.

9.4.10 Recorder Self Test

The Enscribe provides a Self Test Function that can be initiated at powerup. The test may be executed by depressing the Front Panel Button for the first 5 seconds following powerup. Note that once self test has begun, the Front Panel Button may be released.

- When Self Test is executed, the Enscribe firsts prints the following information:
- Enscribe Software Version
- Node Name (i.e. REC0016)
- Serial Number
- The Self Test then executes the following tests:
- Recorder Command - checks AR-42 print engine capability of receiving commands

Recorder Address/Data - checks address and data line integrity of the AR-42 print engine interface

- Boot Checksum - verifies integrity of the Enscribe Boot Sector Flash Memory
- Application Checksum - verifies Integrity of the Enscribe Application Sector Flash
- Memory
- Memory - Verifies read/write capability of RAM memory
- The results of these tests are **printed as Pass/Fail.**

The Self Test also tests the Ethernet interface by checking for connected ethernet nodes. Even when no other nodes are active, the Enscribe will detect its own broadcast echoes, thereby verifying ethernet interface operation. The ethernet addresses of the nodes found are printed in the following ethernet format: xx:xx:xx:xx:xx:xx

At the end of Self Test, the AR-42 print engine prints its entire character set.

9.4.11 Recorder Interface

The REC provides a parallel interface to the General Scanning AR-42 Thermal Array Recorder. Read and write operations are provided via an octal bus transceiver using ~CS2 as the chip select. For details on the AR42 interface, refer to the "AR-42 Thermal Recorder/Printer. Instruction Manual."

9.4.12 Connectors Description

Below in Table 8-1, are connectors in the Recorder organized by function. The second column in the table shows the PCB or sub-module on which the connector is found, as well as the reference designation for connectors. Some interconnections are done via cable assemblies soldered directly to PCB – for such cases the Mennen P/N column refers to the cable assembly part number.

Function	PCB RefDes	Pins	Mennen P/N	Comments
REC – AR42	REC-J2,J3 AR42	2×26 50	557-301-000 N/A	Cable assembly soldered to REC PCB
REC – FP	REC-J6 FP-J1	4 4	116-107-864 557-304-000	Cable assembly soldered to FP PCB
REC – PS	REC-J5 PS-P2	6 6	116-144-017 N/A	Connection via cable assembly 557-303-000
REC – JTAG	REC-J7	8	116-107-863	JTAG Test Access Port
REC – RS232	REC-J4	10	116-144-011	Terminal Port, cable assembly 557-302-000
REC - 10Base-T	REC-J1	8	116-554-010	10Base-T Ethernet connection
AC Input - PS	PS-P1	2	557-305-000	AC Input Module Assembly (Recorder)

Table 9-2. Enscribe Recorder Unit Interconnection

The following subsections provide description and pinouts for each connector. For signal pins, the direction of the signal is indicated by one of the symbols: ⇒, ⇐ or ⇔.

AR-42 Connectors (REC-J2, J3)

The AR-42 interface consists of two pre-assembled Mennen flat cable plugs: 26 pin, .100" pitch connectors J2 and J3. Note that since the AR-42 has a 50 pin connector, pin 26 on each of the connectors J2 and J3 is not connected.

Pin #	REC Signal Name		AR42 Signal Name	Description
1	HD0	⇔	Data0	The eight data lines are used by the REC to send one-byte Header commands and data to the recorder. The lines are bi-directional. The recorder can use them to send byte-wide readback status conditions to the REC. The data lines are controlled by the Write and Read lines.
2	HD1	⇔	Data1/TxD	
3	HD2	⇔	Data2	
4	HD3	⇔	Data3	
5	HD4	⇔	Data4	
6	HD5	⇔	Data5	
7	HD6	⇔	Data6	
8	HD7	⇔	Data7	
9	N/C	⇒	Analog2	
10	~WRITE	⇒	-WR/RxD	Write line.
11	~WRRDY	⇐	-WRRDY/~CTS	Write Ready line
12	ERR	⇐	ERR	Error line (goes high when recorder enters the Error state)
13	~INIT	⇒	-RST	Hardware reset line
14	~READ	⇒	-RD	Read line.
15	~RDRDY	⇐	-RDRDY	Read Ready line
16	~SYNC	⇐	-SYNC	SYNC line indicates when the input buffer is empty
17	RDBK0	⇐	RDBK0	Read back line 0
18	HA0	⇒	ADDR0/-RTS	Address lines 0 through 4 are used for the Combined commands. When Combined commands are used, the five address lines are set by the REC and are interpreted by recorder as a particular command.
19	HA1	⇒	ADDR1	
20	HA2	⇒	ADDR2	
21	HA3	⇒	ADDR3	
22	HA4	⇒	ADDR4	
23	RDBK1	⇐	RDBK1	Read back line 0
24	N/C	⇒	Analog0	
25	N/C	⇒	Analog1	
26	N/C			

Table 9-3. AR-42 Interface Signals (REC-J3)

Pin #	REC Signal Name		AR42 Signal Name	Description
1	SWITCH1	⇒	SWITCH1	This line is used by switch interface
2	N/C	⇒	SWITCH2	This line is used by switch interface
3	N/C	⇒	SWITCH3	This line is used by switch interface
4	P5V_D		VLogic	+5VDC Digital
5	P5V_D		VLogic	+5VDC Digital
6	GND_D		GND Logic	Digital Ground
7	GND_D		GND Logic	Digital Ground
8	GND_A		GND 10/18	Analog Ground
9	GND_A		GND 10/18	Analog Ground
10	GND_A		GND 10/18	Analog Ground
11	GND_A		GND 10/18	Analog Ground
12	GND_A		GND 10/18	Analog Ground
13	GND_A		GND 10/18	Analog Ground
14	GND_A		GND 10/18	Analog Ground
15	GND_A		GND 10/18	Analog Ground
16	GND_A		GND 10/18	Analog Ground
17	GND_A		GND 10/18	Analog Ground
18	P12V		V10/18	+12VDC
19	P12V		V10/18	+12VDC
20	P12V		V10/18	+12VDC
21	P12V		V10/18	+12VDC
22	P12V		V10/18	+12VDC
23	P12V		V10/18	+12VDC
24	P12V		V10/18	+12VDC
25	P12V		V10/18	+12VDC
26	N/C			

Table 9-4. AR-42 Interface Signals (REC-J2)

9.4.13 Front Panel Interface Connector (REC-J6, FP-J1)

Pin #	Signal Name	Description	Direction
1	GND_D	Digital Ground	
2	LED2	Green LED anode Red LED cathode on the Front Panel	REC→FP
3	LED1	Red LED anode Green LED cathode on the Front Panel	REC→FP
4	SWITCH1	Push button switch on the Front Panel	REC←FP

Table 9-5. Front Panel Interface Signals

9.4.14 Power Supply Connector (REC-J5, PS-P2)

Pin #	Signal Name	Description
1	P12V	+12VDC
2	P5V_D	+5VDC Digital
3	P5V_D	+5VDC Digital
4	GND_D	Digital Ground
5	GND_A	Analog Ground
6	N/C	

Table 9-6. Power Supply Signals

9.4.15 RS232 Serial Interface Connector (REC-J4)

Pin #	Signal Name	Description
1	N/C	
2	N/C	
3	TXA	SCC1 Transmit Data
4	N/C	
5	RXA	SCC1 Receive Data
6	N/C	
7	RXB	SCC3 Receive Data
8	TXB	SCC3 Transmit Data
9	GND_D	Digital Ground

Pin #	Signal Name	Description
10	GND_D	Digital Ground

Table 9-7. RS232 Serial Interface Signals

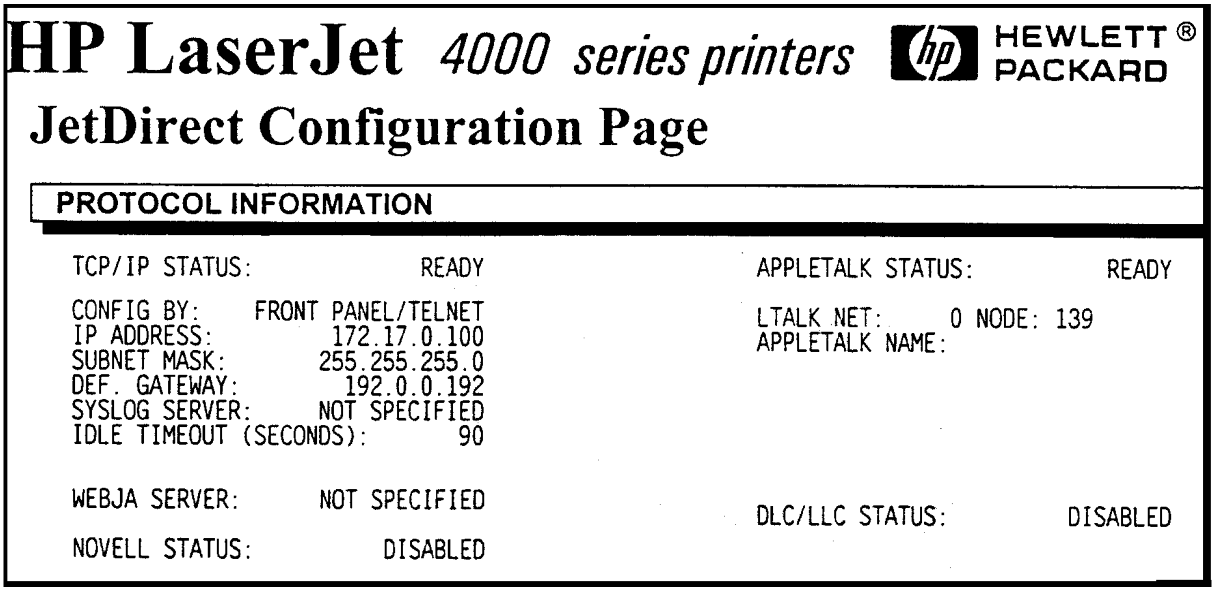
9.4.16 Twisted Pair (10Base-T) Interface (REC-J1)

Pin #	Signal Name	Description
1	TPTX+	Transmit Data (positive) output
2	TPTX-	Transmit Data (negative) output
3	TPRX+	Receive Data (positive) input
4	N/C	
5	N/C	
6	TPRX-	Receive Data (negative) input
7	N/C	
8	N/C	

Table 9-8. 10Base-T Interface Signals

9.5 *Laser Printer*

Configuration information for the HP 4000 and HP4050 Series printers is shown below:



HP LaserJet *4000 series printers* HEWLETT® PACKARD

JetDirect Configuration Page

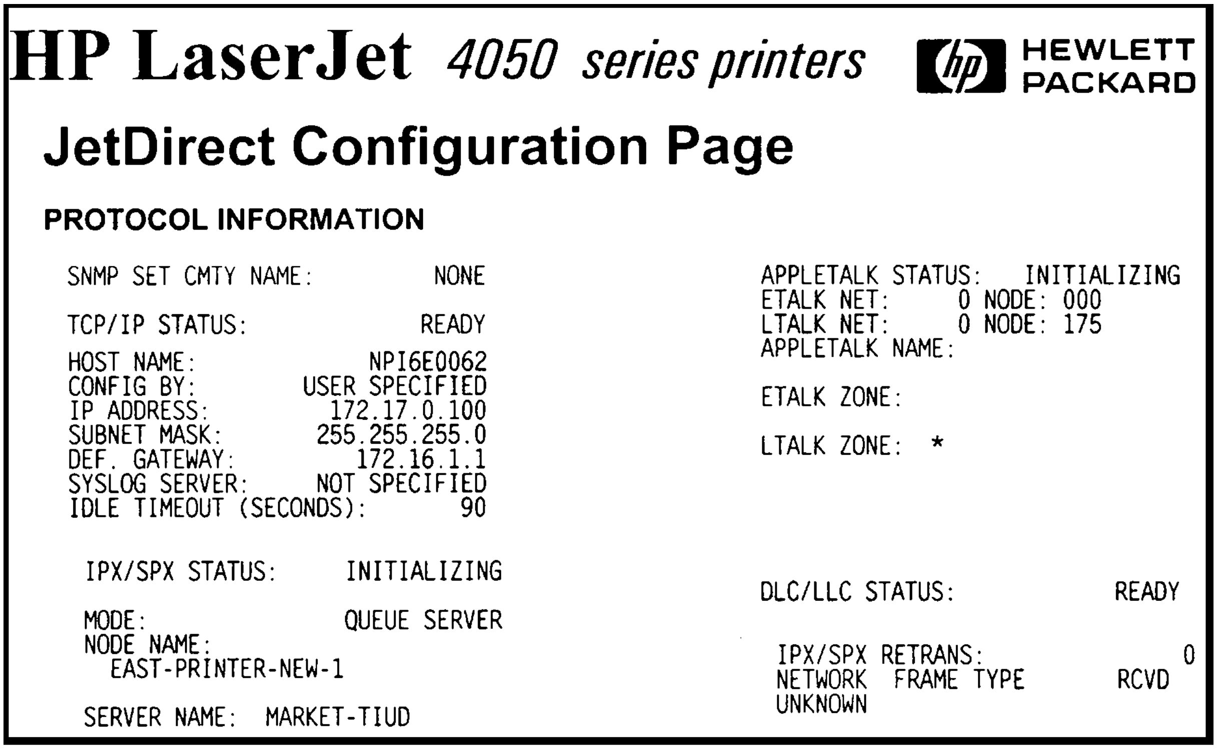
PROTOCOL INFORMATION

```
TCP/IP STATUS:               READY          APPLETALK STATUS:          READY

CONFIG BY:     FRONT PANEL/TELNET           LTALK NET:      0 NODE: 139
IP ADDRESS:          172.17.0.100           APPLETALK NAME:
SUBNET MASK:        255.255.255.0
DEF. GATEWAY:         192.0.0.192
SYSLOG SERVER:      NOT SPECIFIED
IDLE TIMEOUT (SECONDS):        90

WEBJA SERVER:       NOT SPECIFIED           DLC/LLC STATUS:         DISABLED

NOVELL STATUS:           DISABLED
```



HP LaserJet *4050 series printers* HEWLETT PACKARD

JetDirect Configuration Page

PROTOCOL INFORMATION

```
SNMP SET CMTY NAME:          NONE           APPLETALK STATUS:   INITIALIZING
                                            ETALK NET:      0 NODE: 000
TCP/IP STATUS:              READY           LTALK NET:      0 NODE: 175
                                            APPLETALK NAME:
HOST NAME:               NPI6E0062
CONFIG BY:          USER SPECIFIED          ETALK ZONE:
IP ADDRESS:           172.17.0.100
SUBNET MASK:         255.255.255.0          LTALK ZONE:  *
DEF. GATEWAY:           172.16.1.1
SYSLOG SERVER:       NOT SPECIFIED
IDLE TIMEOUT (SECONDS):         90

 IPX/SPX STATUS:     INITIALIZING           DLC/LLC STATUS:            READY

 MODE:               QUEUE SERVER            IPX/SPX RETRANS:              0
 NODE NAME:                                  NETWORK  FRAME TYPE        RCVD
   EAST-PRINTER-NEW-1                        UNKNOWN

 SERVER NAME:  MARKET-TIUD
```

Chapter 10

Technical Drawings

This chapter includes the following:

- Cables Assembly Drawings
- Mechanical Drawings
  1. Main Processing Unit Type II – Top Assembly
  2. Module ECG Leads – Top Assembly
  3. Module ECG 3/5/6 Leads – Top Assembly
  4. Module 2BP / CO - - Top Assembly
  5. Module Top BP Module – Top Assembly
  6. Module CO2 / Temp – Top Assembly
  7. Two Temp Module – Top Assembly
  8. NIBP (“CAS”) Module – Top Assembly
  9. SPO2 (Nellcor MP204P) Module – Top Assembly
  10. Module EtCO2 - Top Assembly
  11. Remote Control MCU Assembly
  12. Module Rack #6 – Top Assembly
  13. Module EtCO2 Single Top Assembly
  14. Module Uniport Top Assembly

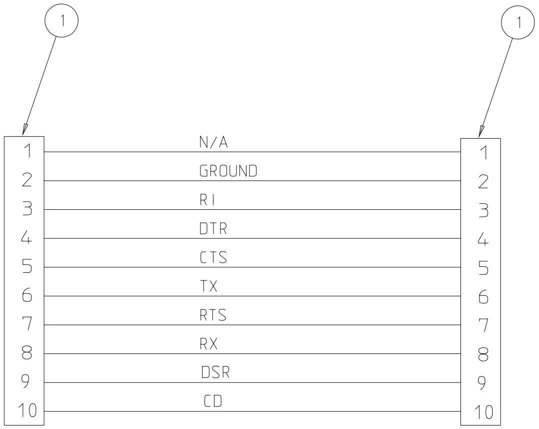
Cables Assembly Drawings

Description	Part Number (P/N)	
	Drawing	Bill of Material (BM)
Cable assy. – MB to MPU/Splitter	554-304-010	554-304-010
Cable assy. – MPU/Splitter to COM2	554-304-011	554-304-011
Cable assy. – Parallel port	554-304-012	554-304-012
Cable assy. – MPU to COM	554-304-013	554-304-013
Cable assy. – LAN thru internal cable	554-304-014	554-304-014
Cable assy. – IDE Envoy MPU	554-304-015	554-304-015
Cable assy. – Envoy int cable speaker to SB	554-304-016	554-304-016
Cable assy. – Keyboard cable	554-304-017	554-304-017
Cable assy. – MPU – VGA Video output	554-305-011	554-305-011
Lan cable assy.	554-314-001	554-314-xxx
	554-314-002	
	554-314-004	
	554-314-008	

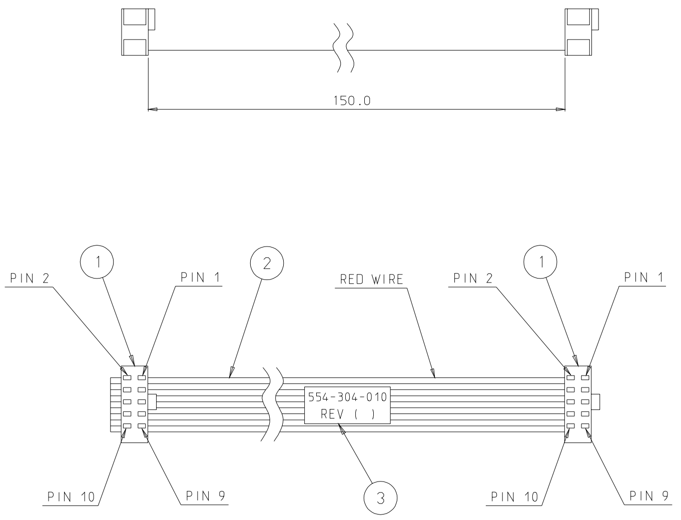
Drawings of Cables:

- BP cable
- CO Adapter cable Ice Bath
- CO Set Adapter cable
- SPO2 cable
- ECG 3 leads cable
- ECG 6 leads cable
- ECG 5 leads cable
- Two Temperature Adapter

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.


1
1
N/A
GROUND
RI
DTR
CTS
TX
RTS
RX
DSR
CD
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10

WIRING DIAGRAM


150.0
PIN 2
1
PIN 1
2
RED WIRE
PIN 2
1
PIN 1
554-304-010
REV ( )
PIN 10
PIN 9
3
PIN 10
PIN 9

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KIRYAT WEIZMANN SCIENCE PARK
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DESIGN	AVI TOREN	19.06.97
DRAWIN	AVI TOREN	19.06.97
CHECK	AVISHAY SH.	18.09.97
PROJ. ENGER.	SHMUEL Y.	18.09.97
Q.C	M.ULMAN	18.09.97

RELEASE FOR PRODUCTION
DATE 18.09.97 BY ARIK A.

MATERIAL :

FINISH :

DESCRIPTION :

CABLE ASSY. M.B. TO MCU/SPLITTER

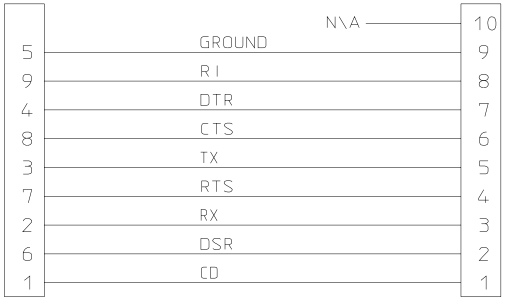
PART No :554-304-010

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

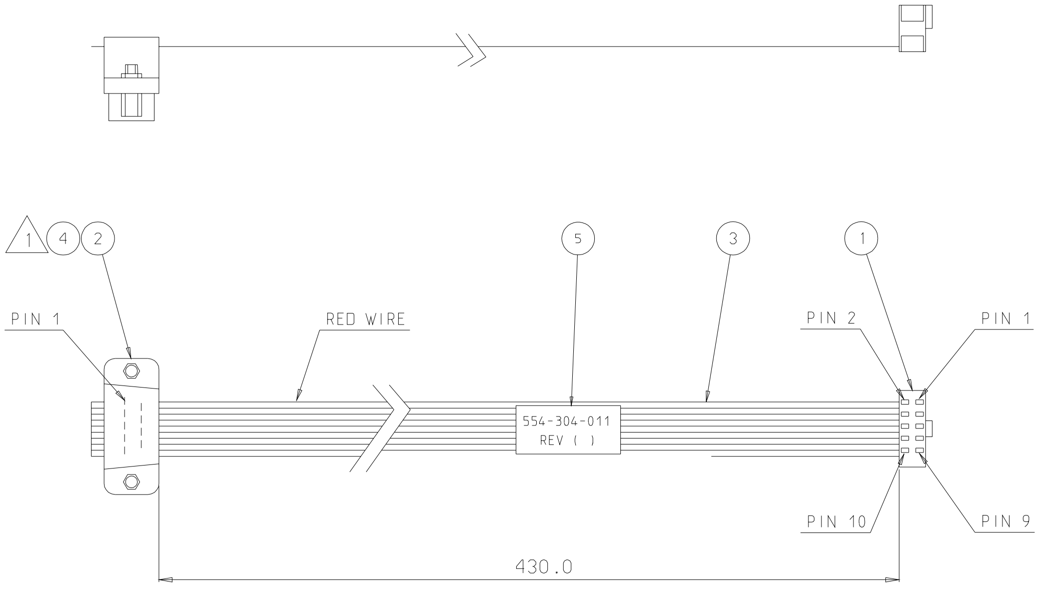
SCALE : 1:1
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH.√
DIMENSIONS MM
REV. -

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.



5
9
4
8
3
7
2
6
1
N\A
GROUND
RI
DTR
CTS
TX
RTS
RX
DSR
CD
10
9
8
7
6
5
4
3
2
1

WIRING DIAGRAM



1
4
2
5
3
1
PIN 1
RED WIRE
PIN 2
PIN 1
554-304-011
REV ( )
PIN 10
PIN 9
430.0

NOTE:

1. DO NOT ASSEMBLR FEMALE SCREW (ITEM 4) PUT IT INTO THE BAG

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DESIGN	AVI TOREN	19.06.97
DRAWIN	AVI TOREN	19.06.97
CHECK	AVISHAY SH.	21.09.97
PROJ. ENGER.	SHMUEL Y.	21.09.97
Q.C	ULMAN M.	21.09.97
RELEASE FOR PRODUCTION DATE	21.09.97 BY ARIK A.	

MATERIAL :

FINISH :

DESCRIPTION :

CABLE ASSY MCU/SPLITTER TO COM2

PART No :554-304-011

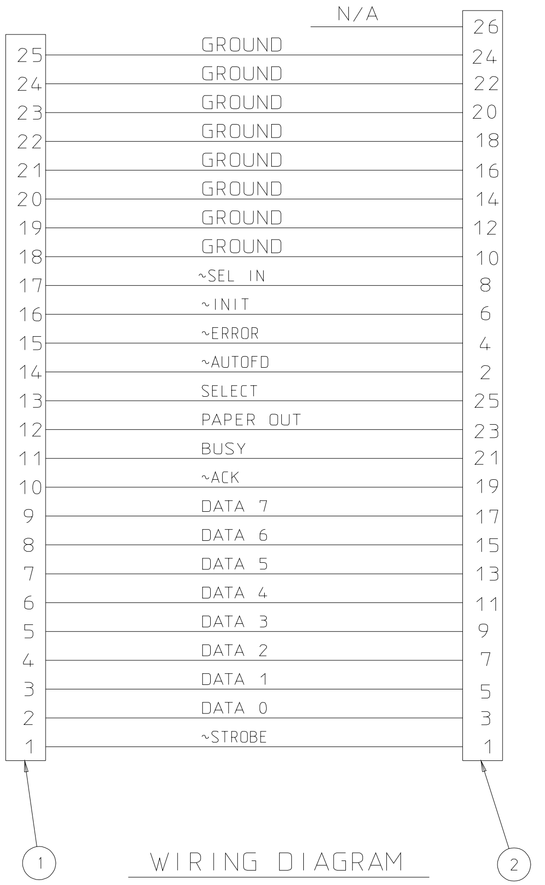
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

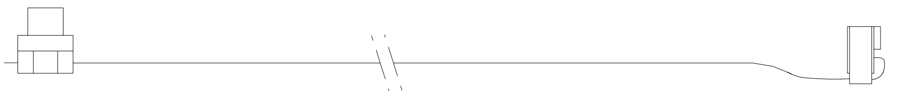
SCALE : 1:1 SHEET 1 OF 1	SIZE A3	SURFACE ROUGH.√	DIMENSIONS MM
		REV.	A

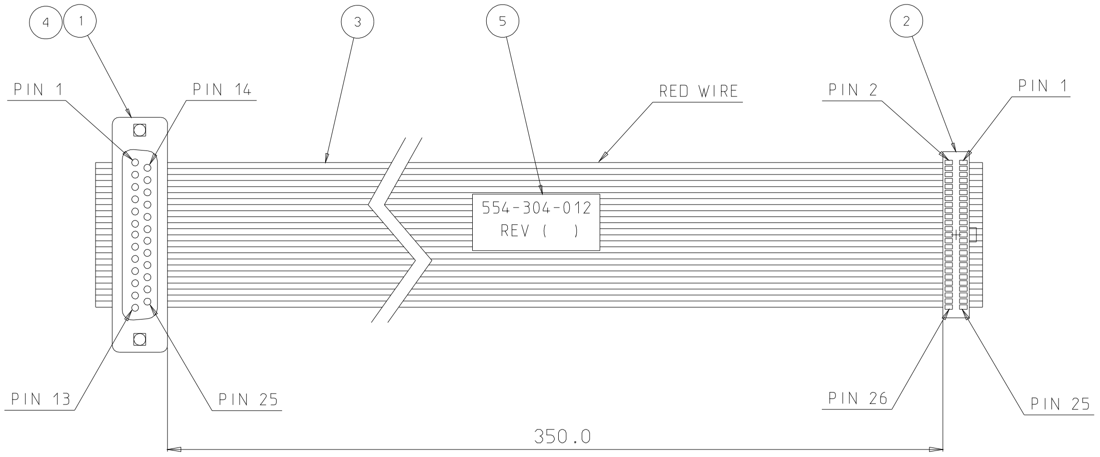
REVISIONS

REV	DESCRIPTION	DATE	SIGN.


N/A
25 GROUND 24
24 GROUND 22
23 GROUND 20
22 GROUND 18
21 GROUND 16
20 GROUND 14
19 GROUND 12
18 GROUND 10
17 ~SEL IN 8
16 ~INIT 6
15 ~ERROR 4
14 ~AUTOFD 2
13 SELECT 25
12 PAPER OUT 23
11 BUSY 21
10 ~ACK 19
9 DATA 7 17
8 DATA 6 15
7 DATA 5 13
6 DATA 4 11
5 DATA 3 9
4 DATA 2 7
3 DATA 1 5
2 DATA 0 3
1 ~STROBE 1
26
1
2

WIRING DIAGRAM




4
1
3
5
2
PIN 1
PIN 14
RED WIRE
PIN 2
PIN 1
554-304-012
REV ( )
PIN 13
PIN 25
PIN 26
PIN 25
350.0

NOTES:

1. DON'T ASSEMBLE ITEM 4.PUT IT INTO THE BAG.

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FAX : 972-8-406519

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DESIGN	DUDY B.	6.10.97
DRAWIN	DUDY B.	6.10.97
CHECK	AVISHAY S.	7.10.97
PROJ. ENGER.	VOLOSHIN A.	7.10.97
Q.C	ULMAN M.	7.10.97

RELEASE FOR PRODUCTION
DATE 7.10.97 BY SIVANA LOPO

MATERIAL :

DESCRIPTION :
CABLE ASSY. PARALLEL PORT

FINISH :

PART No :554-304-012

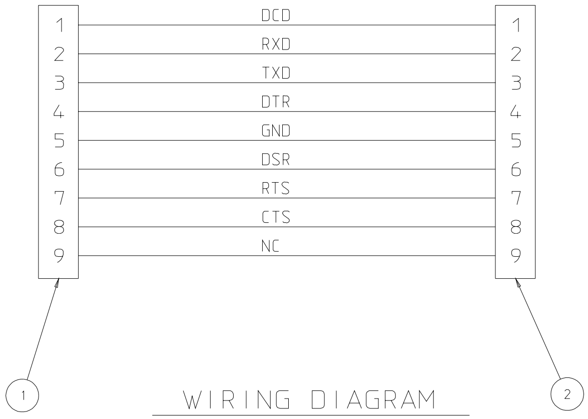
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

SCALE : 1:1
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH.√
DIMENSIONS MM
REV. -

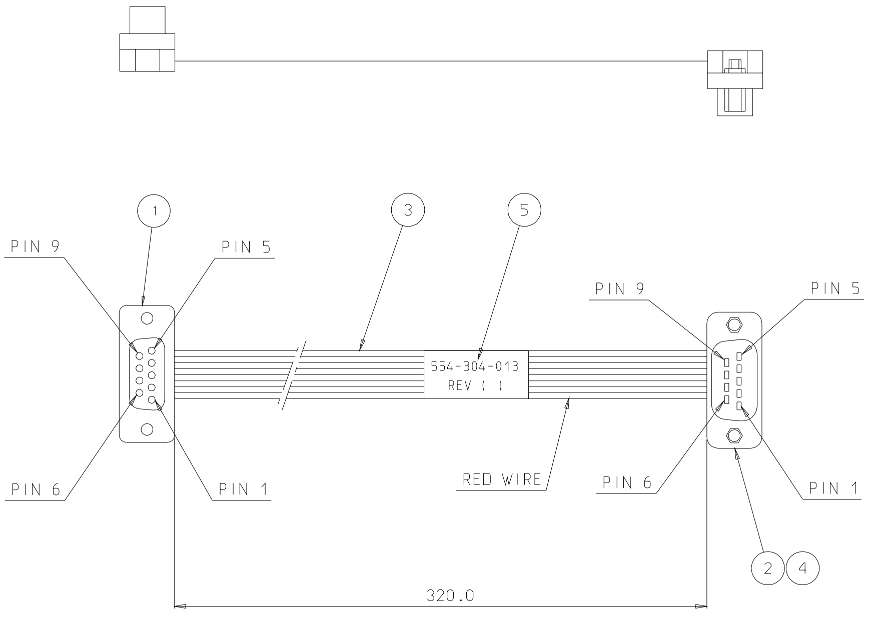
REVISIONS

REV	DESCRIPTION	DATE	SIGN.
A	ECN 7706	5.11.97	M.U.



DCD
RXD
TXD
DTR
GND
DSR
RTS
CTS
NC
1
2
3
4
5
6
7
8
9
1
2
3
4
5
6
7
8
9
①
②

WIRING DIAGRAM



①
③
⑤
PIN 9
PIN 5
PIN 6
PIN 1
554-304-013
REV ( )
RED WIRE
PIN 9
PIN 5
PIN 6
PIN 1
②
④
320.0

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FAX : 972-8-406519

DESIGN	AVI TOREN	19.07.97
DRAWIN	AVI TOREN	19.07.97
CHECK	DUDY B.	5.11.97
PROJ. ENGER.	KHANCHIN M.	5.11.97
Q.C	M.ULMAN	5.11.97

RELEASE FOR PRODUCTION
DATE 5.11.97 BY ARIK A.

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MATERIAL : N/A

DESCRIPTION : CABLE ASSY CPU TO COM

FINISH : N/A

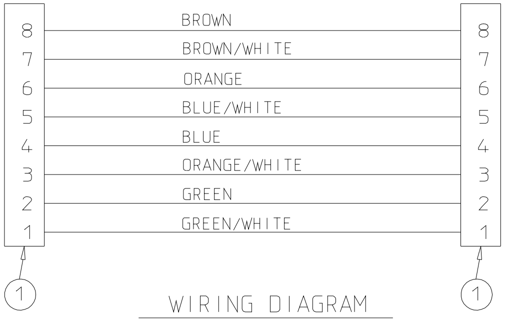
PART No :554-304-013

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

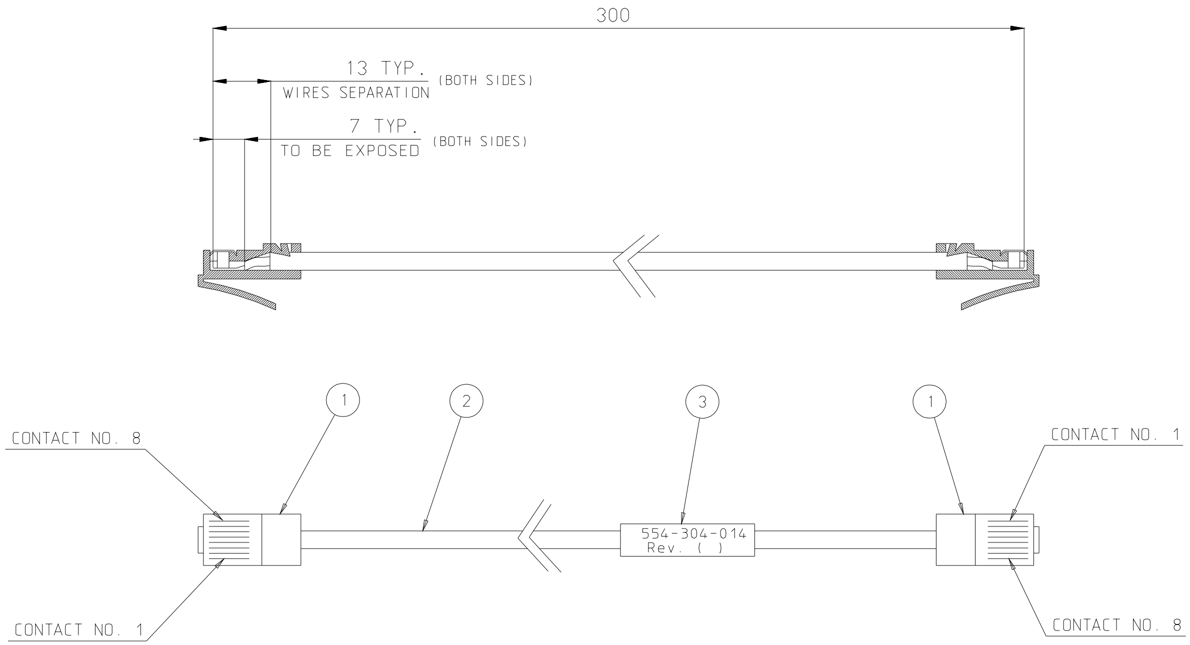
TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

SCALE : 1:1
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH.√
DIMENSIONS MM
REV. A

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
A	ECN.7774		


8
7
6
5
4
3
2
1
BROWN
BROWN/WHITE
ORANGE
BLUE/WHITE
BLUE
ORANGE/WHITE
GREEN
GREEN/WHITE
8
7
6
5
4
3
2
1
①
①

WIRING DIAGRAM


300
13 TYP.
WIRES SEPARATION
(BOTH SIDES)
7 TYP.
TO BE EXPOSED
(BOTH SIDES)
①
②
③
①
CONTACT NO. 8
CONTACT NO. 1
554-304-014
Rev. ( )
CONTACT NO. 1
CONTACT NO. 8

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FAX : 972-8-406519

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DESIGN	ROI B.N.	25.01.98
DRAWIN	ROI B.N.	25.01.98
CHECK		
PROJ. ENGER.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

FINISH :

DESCRIPTION :
CABLE ASSY. LAN THRU
INTERNAL CABLE

PART No :554-304-014

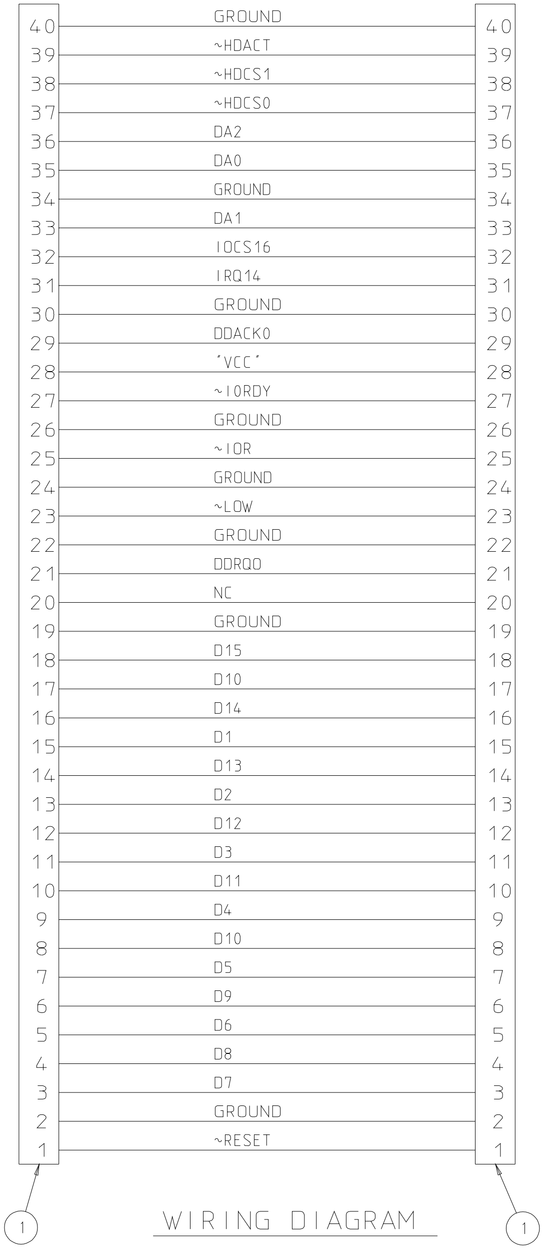
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

SCALE : 1:1
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH. √
DIMENSIONS : MM
REV. A

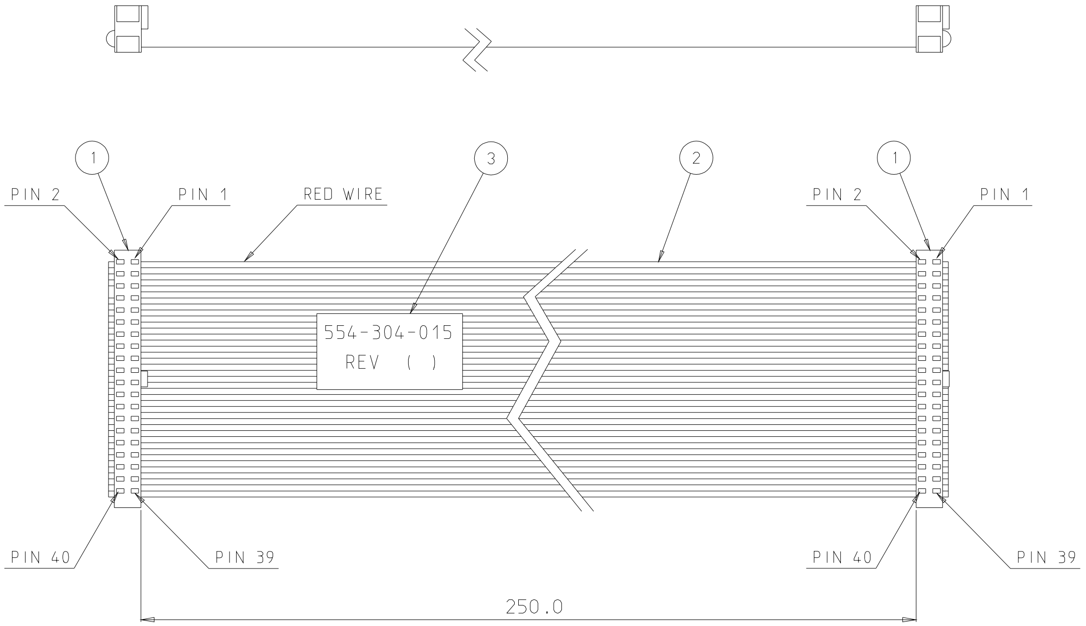
REVISIONS

REV	DESCRIPTION	DATE	SIGN.



40	GROUND	40
39	~HDACT	39
38	~HDCS1	38
37	~HDCS0	37
36	DA2	36
35	DA0	35
34	GROUND	34
33	DA1	33
32	IOCS16	32
31	IRQ14	31
30	GROUND	30
29	DDACK0	29
28	'VCC'	28
27	~IORDY	27
26	GROUND	26
25	~IOR	25
24	GROUND	24
23	~LOW	23
22	GROUND	22
21	DDRQ0	21
20	NC	20
19	GROUND	19
18	D15	18
17	D10	17
16	D14	16
15	D1	15
14	D13	14
13	D2	13
12	D12	12
11	D3	11
10	D11	10
9	D4	9
8	D10	8
7	D5	7
6	D9	6
5	D6	5
4	D8	4
3	D7	3
2	GROUND	2
1	~RESET	1

WIRING DIAGRAM



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FAX : 972-8-406519

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DESIGN	AVI TOREN	19.06.97
DRAWIN	AVI TOREN	19.06.97
CHECK	AVISHAY SH.	
PROJ. ENGER.	SHMUEL Y.	17.09.97
Q.C	ULMAN M.	18.09.97

RELEASE FOR PRODUCTION
DATE 21.09.97 BY ARIK A.

MATERIAL :

DESCRIPTION :
CABLE ASSY. IDE
ENVOY CPU

FINISH :

PART No :554-304-015

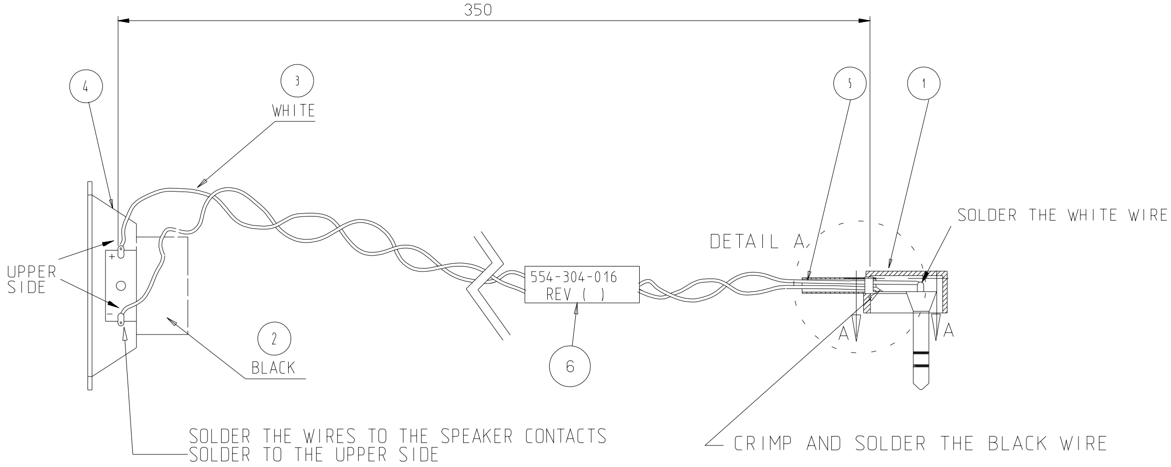
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

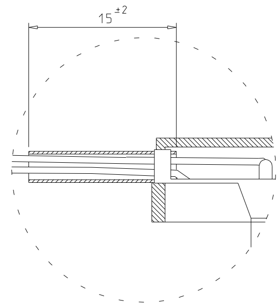
TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

SCALE : 1:1
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH.√
DIMENSIONS MM
REV. -

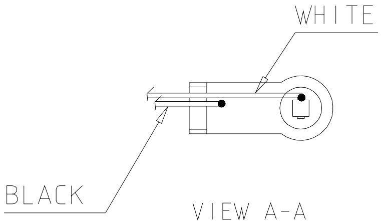
REVISIONS

REV	DESCRIPTION	DATE	SIGN.
A	ECN 7711		
B	ECN 7756		
C	ECN 7810		
D	ECN 7859		


350
④
③
WHITE
UPPER SIDE
+
-
②
BLACK
554-304-016
REV ( )
⑥
DETAIL A
⑤
①
A
A
SOLDER THE WHITE WIRE
SOLDER THE WIRES TO THE SPEAKER CONTACTS
SOLDER TO THE UPPER SIDE
CRIMP AND SOLDER THE BLACK WIRE



DETAIL A
SCALE 2:1


WHITE
BLACK

VIEW A-A

TOP VIEW
WITHOUT COVER

KIRYAT WEIZMANN SCIENCE PARK
P.O.B. 102, REHOVOT 76100, ISRAEL
TEL : 972-8-9383030
FAX : 972-8-9406519

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DESIGN	AVI TOREN	4.3.98
DRAWIN	DAFNA SAPIR	26.5.98
CHECK		
PROJ. ENGER.		
Q . C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

DESCRIPTION :
CABLE ASSY."ENVOY" INT. CABLE
SPEAKER TO S.B.

FINISH :

PART No : 554-304-016

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS : ±10
HOLES :
HOLES LOCATION :
ANGLES :

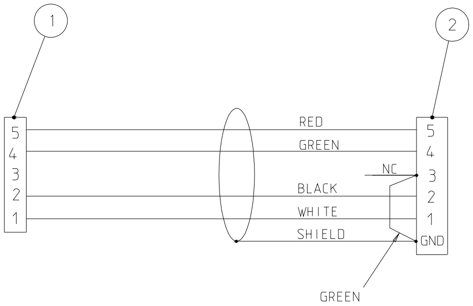
SCALE : 1 : 1
SHEET 1 OF 1
SIZE A3

SURFACE ROUGH. √

DIMENSIONS : MM

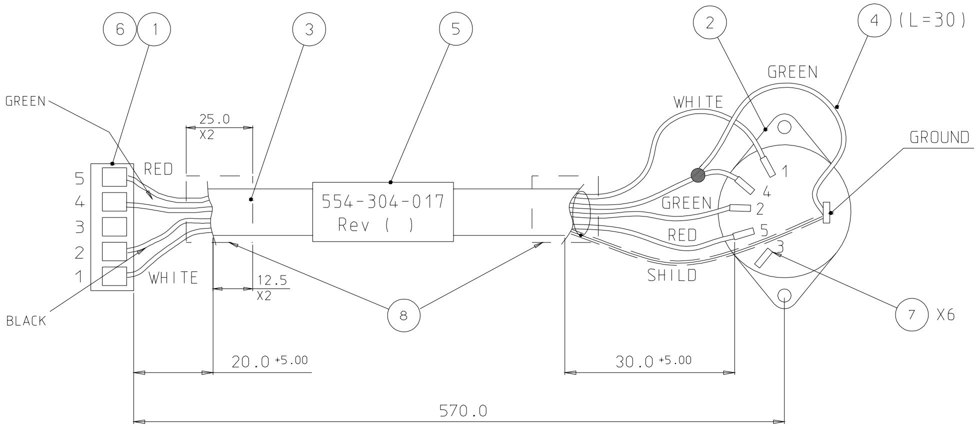
REV.
D

REVISIONS			
A			



1
2
5
4
3
2
1
RED
GREEN
NC
BLACK
WHITE
SHIELD
5
4
3
2
1
GND
GREEN

WIRING DIAGRAM



6
1
3
5
2
4
(L=30)
GREEN
WHITE
GREEN
GROUND
RED
25.0
X2
554-304-017
Rev ( )
5
4
3
2
1
1
4
2
5
3
GREEN
RED
SHILD
WHITE
12.5
X2
BLACK
8
7
X6
20.0 +5.00
30.0 +5.00
570.0

KIRYAT WEIZMANN SCIENCE PARK
P.O.B. 102, REHOVOT 76100, ISRAEL
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FAX : 972-8-406519

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DESIGN	AVI TOREN	06.08.97
DRAWIN	AVI TOREN	06.08.97
CHECK	AVISHAY SH.	21.09.97
PROJ. ENGER.	SHMUEL Y.	21.09.97
Q.C.	ULMAN M.	21.09.97

RELEASE FOR PRODACTION
DATE 21.09.97 BY ARIK A.

MATERIAL : N/A

DESCRIPTION :
CABLE ASSY.
KEYBOARD CABLE

FINISH : N/A

PART No :554-304-017

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM
UNLESS
OTHERWISE
SPECIFIED
LENGTHS ±10
HOLES :
HOLES
LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1
SIZE A3

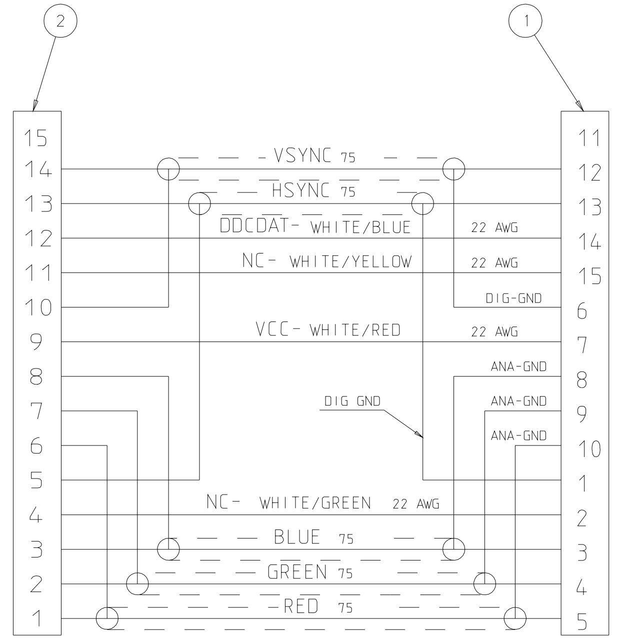
SURFACE ROUGH. √

DIMENSIONS MM

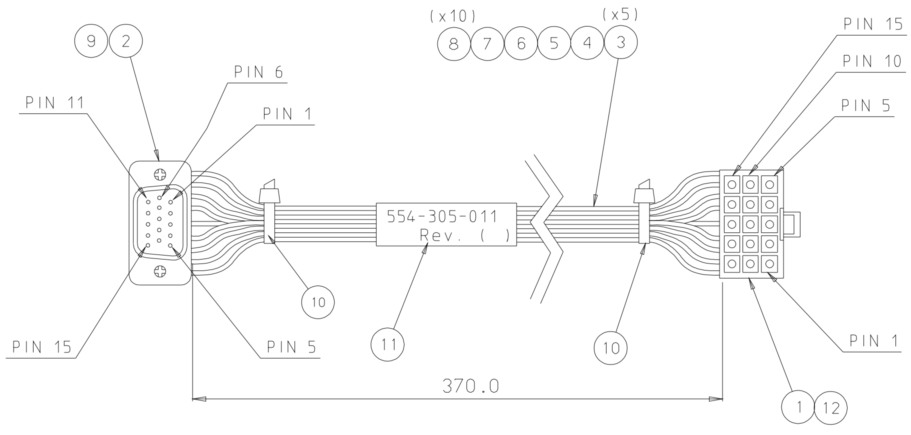
REV.
A

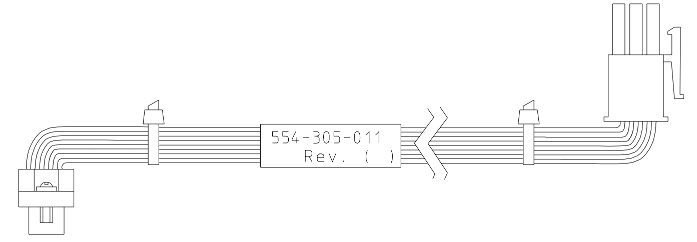
REVISIONS

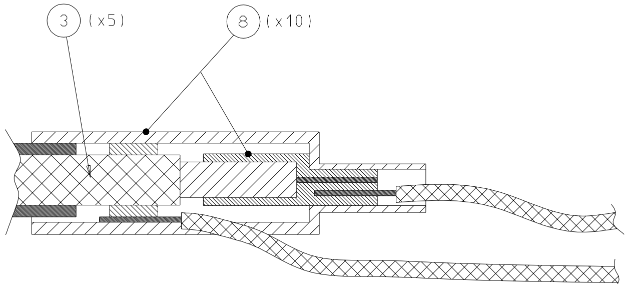
REV	DESCRIPTION	DATE	SIGN.


2
1
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
11
12
13
14
15
6
7
8
9
10
1
2
3
4
5
-VSYNC 75
HSYNC 75
DDCDAT- WHITE/BLUE
22 AWG
NC- WHITE/YELLOW
22 AWG
DIG-GND
VCC- WHITE/RED
22 AWG
ANA-GND
DIG GND
ANA-GND
ANA-GND
NC- WHITE/GREEN 22 AWG
BLUE 75
GREEN 75
-RED 75

WIRING DIAGRAM


(x10)
8 7 6 5 4 3
(x5)
9 2
PIN 11
PIN 6
PIN 1
PIN 15
PIN 5
PIN 10
PIN 5
PIN 1
554-305-011
Rev. ( )
10
11
10
370.0
1 12


554-305-011
Rev. ( )



ITEM 8

COAXIAL CABLES FERRULE
10 PLACES (5 EACH SIDE)

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P.O.B. 102, REHOVOT 76100, ISRAEL
TEL : 972-8-383030
FAX : 972-8-406519

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DESIGN	AVI TOREN	24.06.97
DRAWIN	AVI TOREN	24.06.97
CHECK	AVISHAY SH.	
PROJ. ENGER.	SHMUEL Y.	18.09.97
Q.C	ULMAN M.	18.09.97

RELEASE FOR PRODUCTION
DATE 21.09.97 BY ARIK A.

MATERIAL : N/A

DESCRIPTION :
CABLE ASSY. CPU - VGA
VIDEO OUTPUT

FINISH : N/A

PART No :554-305-011

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM
UNLESS
OTHERWISE
SPECIFIED
LENGTHS: ±10
HOLES:
HOLES
LOCATION:
ANGLES:

SCALE :
SHEET 1 OF 1
SIZE
A3

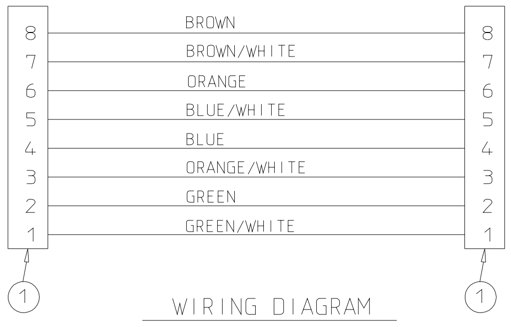
SURFACE ROUGH.√

DIMENSIONS : MM

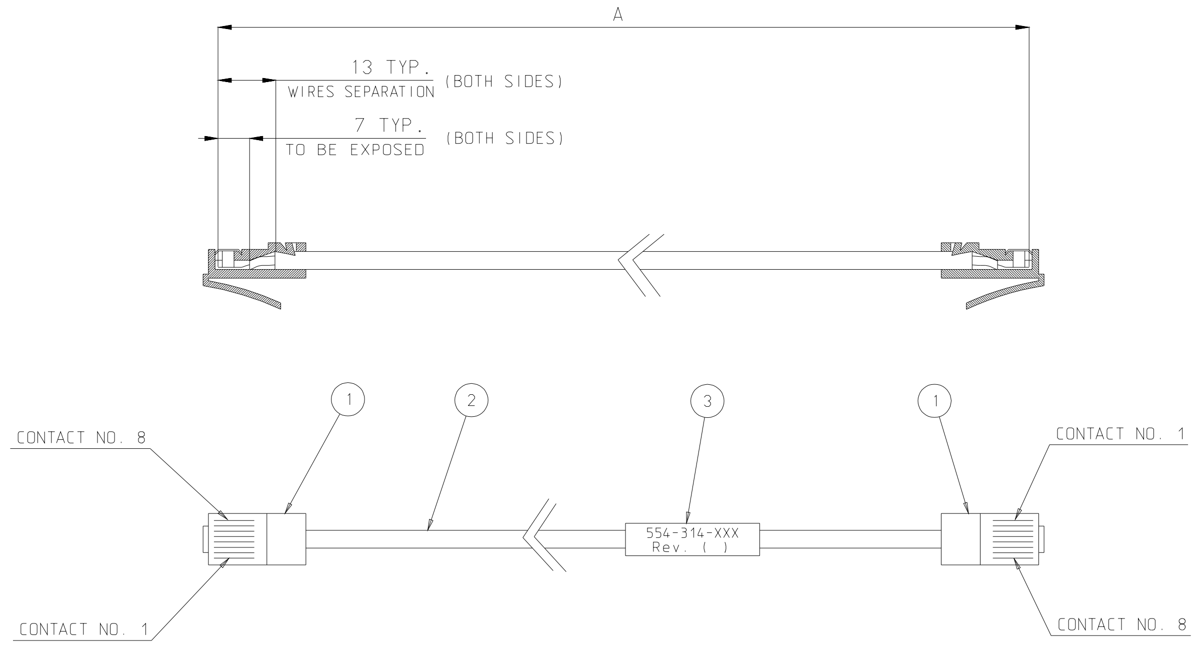
REV.
-

REVISIONS

REV	DESCRIPTION	DATE	SIGN.


8
7
6
5
4
3
2
1
BROWN
BROWN/WHITE
ORANGE
BLUE/WHITE
BLUE
ORANGE/WHITE
GREEN
GREEN/WHITE
8
7
6
5
4
3
2
1
①
①

WIRING DIAGRAM


A
13 TYP.
WIRES SEPARATION
(BOTH SIDES)
7 TYP.
TO BE EXPOSED
(BOTH SIDES)
CONTACT NO. 8
CONTACT NO. 1
①
②
③
①
554-314-XXX
Rev. ( )
CONTACT NO. 1
CONTACT NO. 8

CAT No.	DIM "A" (MM)
554-314-001	300
554-314-002	600
554-314-004	1200
554-314-008	2400

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DESIGN	AVI TOREN	19.06.97
DRAWIN	AVI TOREN	19.06.97
CHECK	AVISHAY SH.	18.09.97
PROJ. ENGER.	SHMUEL Y.	18.09.97
Q.C	ULMAN M.	18.09.97

RELEASE FOR PRODUCTION
DATE 18.09.97 BY ARIK A.

MATERIAL :

DESCRIPTION :

LAN CABLE ASSY.

FINISH :

PART No :554-314-XXX

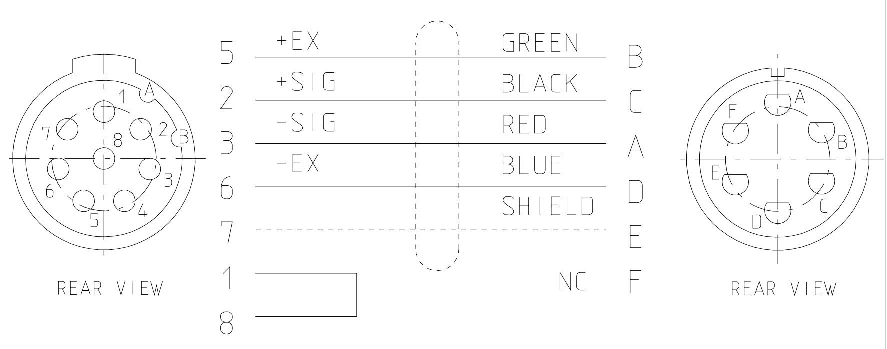
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±10
HOLES:
HOLES LOCATION:
ANGLES:

SCALE : 1:1
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH.√
DIMENSIONS MM
REV. -

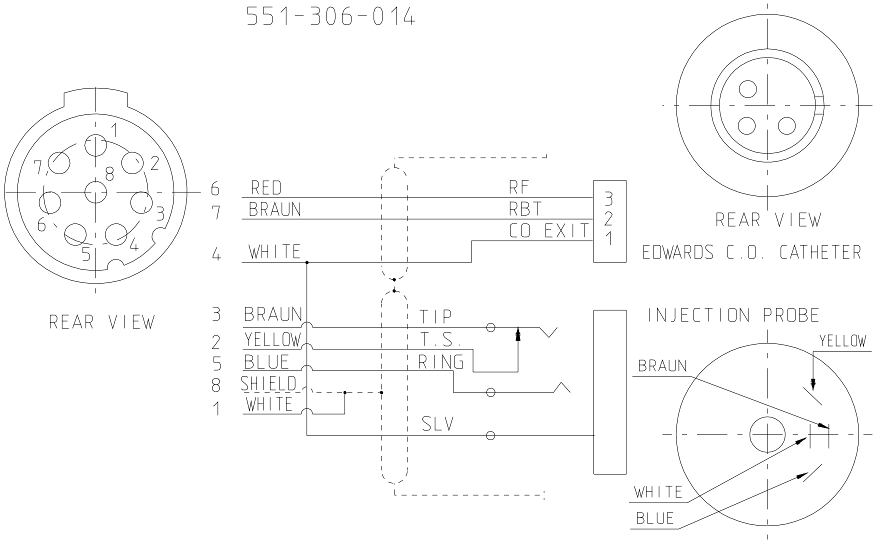
REVISIONS			
REV	DESCRIPTION	DATE	SIGN.

BLOOD PRESSURE CABLE
551-306-011



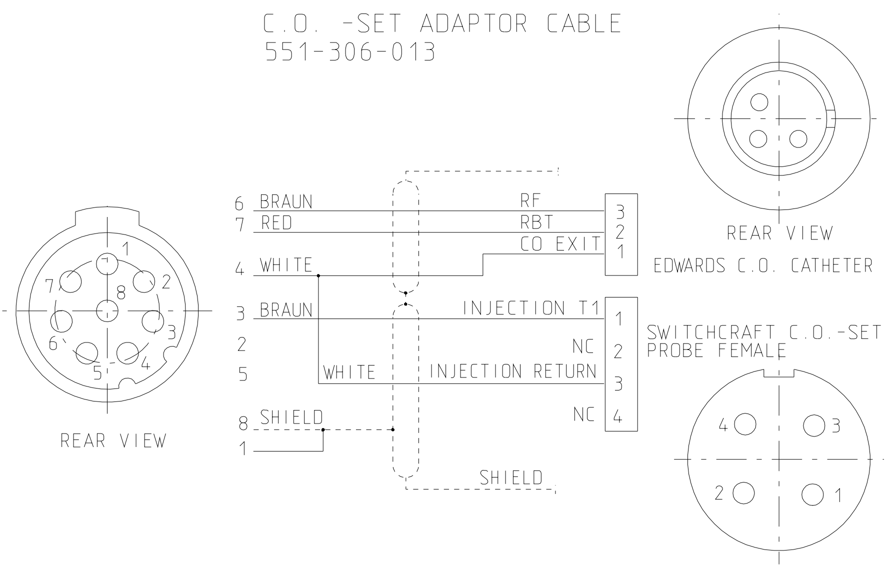
5 +EX GREEN B
2 +SIG BLACK C
3 -SIG RED A
6 -EX BLUE D
SHIELD
7 E
1 NC F
8
1
2
3
4
5
6
7
8
A
B
C
D
E
F
REAR VIEW
REAR VIEW

C.O. ADAPTOR CABLE ICE BATH
551-306-014



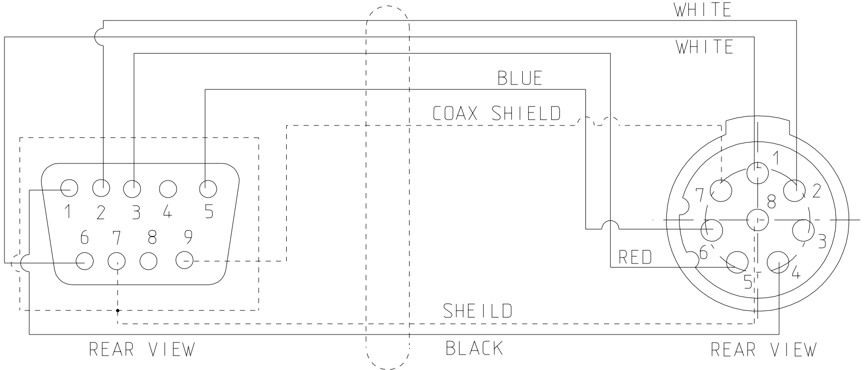
REAR VIEW
6 RED
7 BRAUN
4 WHITE
3 BRAUN
2 YELLOW
5 BLUE
8 SHIELD
1 WHITE
RF
RBT
CO EXIT
3
2
1
TIP
T.S.
RING
SLV
REAR VIEW
EDWARDS C.O. CATHETER
INJECTION PROBE
BRAUN
YELLOW
WHITE
BLUE

C.O. -SET ADAPTOR CABLE
551-306-013



REAR VIEW
6 BRAUN
7 RED
4 WHITE
3 BRAUN
2
5
8 SHIELD
1
WHITE
RF
RBT
CO EXIT
3
2
1
INJECTION T1
NC
INJECTION RETURN
NC
1
2
3
4
SHIELD
REAR VIEW
EDWARDS C.O. CATHETER
SWITCHCRAFT C.O.-SET
PROBE FEMALE

SPO2 CABLE
551-306-015



WHITE
WHITE
BLUE
COAX SHIELD
RED
SHEILD
BLACK
1 2 3 4 5
6 7 8 9
REAR VIEW
REAR VIEW

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DESIGN	DAFNA	12.4.99
DRAWIN	DAFNA	12.4.99
CHECK		
PROJ. ENGER.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

DESCRIPTION :
WIRING DIAGRAMS

FINISH :

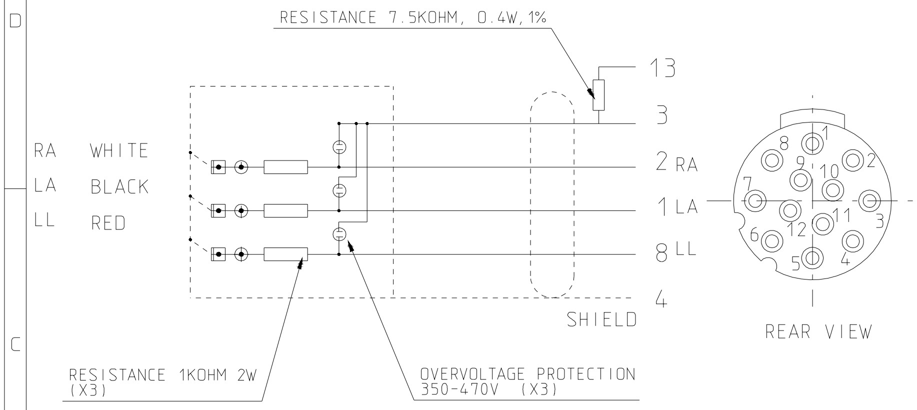
PART No :

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

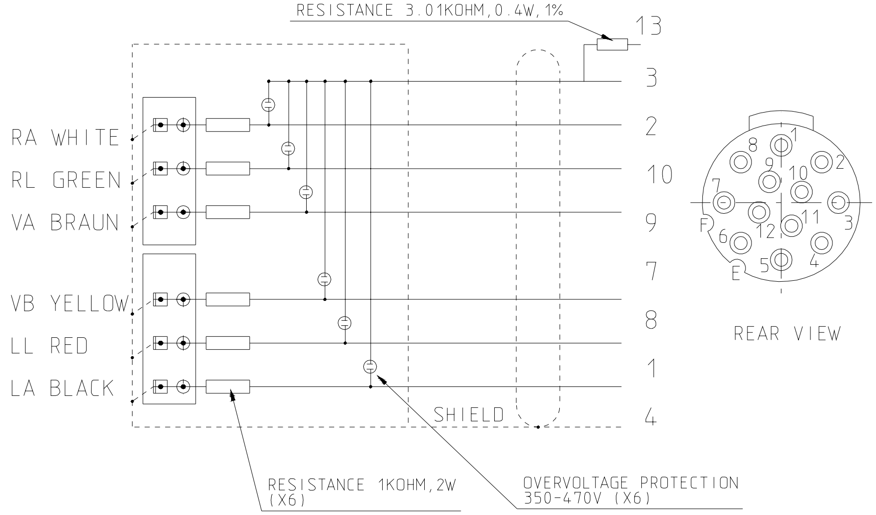
TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

SCALE : NTS
SHEET 1 OF 2
SIZE A3
SURFACE ROUGH.√
DIMENSIONS MM
REV. -

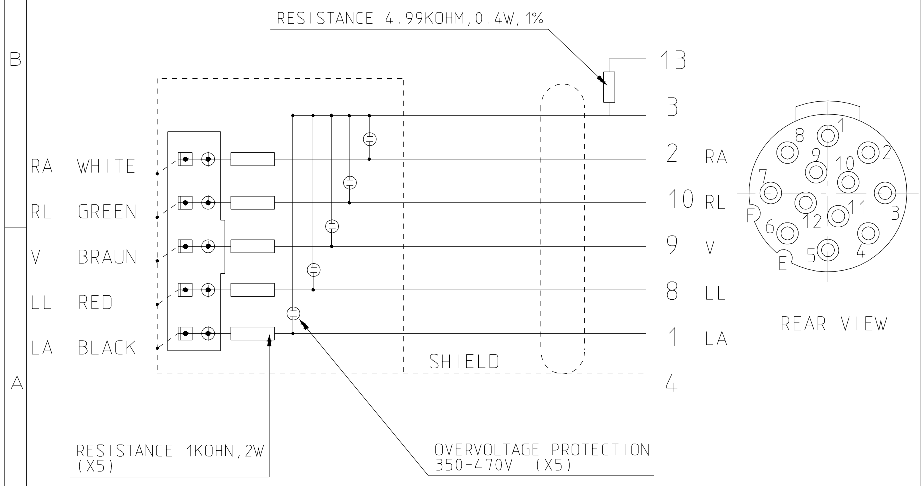
ECG 3 LEADS CABLE
551-306-016


RESISTANCE 7.5KOHM, 0.4W, 1%
13
3
2 RA
1 LA
8 LL
4
SHIELD
RA WHITE
LA BLACK
LL RED
REAR VIEW
RESISTANCE 1KOHM 2W (X3)
OVERVOLTAGE PROTECTION 350-470V (X3)
1
2
3
4
5
6
7
8
9
10
11
12

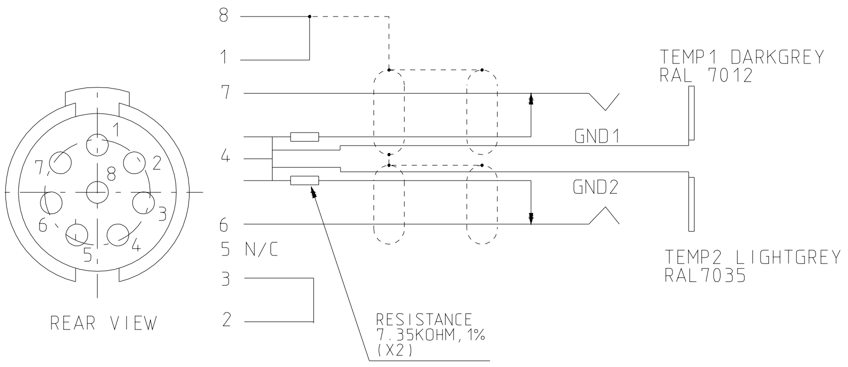
ECG 6 LEADS CABLE
551-306-018


RESISTANCE 3.01KOHM, 0.4W, 1%
13
3
2
10
9
7
8
1
4
RA WHITE
RL GREEN
VA BRAUN
VB YELLOW
LL RED
LA BLACK
SHIELD
REAR VIEW
RESISTANCE 1KOHM, 2W (X6)
OVERVOLTAGE PROTECTION 350-470V (X6)
F
E

ECG 5 LEADS CABLE
551-306-017


RESISTANCE 4.99KOHM, 0.4W, 1%
13
3
2 RA
10 RL
9 V
8 LL
1 LA
4
RA WHITE
RL GREEN
V BRAUN
LL RED
LA BLACK
SHIELD
REAR VIEW
RESISTANCE 1KOHN, 2W (X5)
OVERVOLTAGE PROTECTION 350-470V (X5)
F
E

TWO TEMPERATURE ADAPTOR
551-306-023


8
1
7
4
6
5 N/C
3
2
TEMP1 DARKGREY RAL 7012
GND1
GND2
TEMP2 LIGHTGREY RAL7035
RESISTANCE 7.35KOHM, 1% (X2)
REAR VIEW

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DESCRIPTION: WIRING DIAGRAMS
PART No
SCALE : NTS
SHEET 2 OF 2
SIZE A3
REV. -

Mechanical Drawings

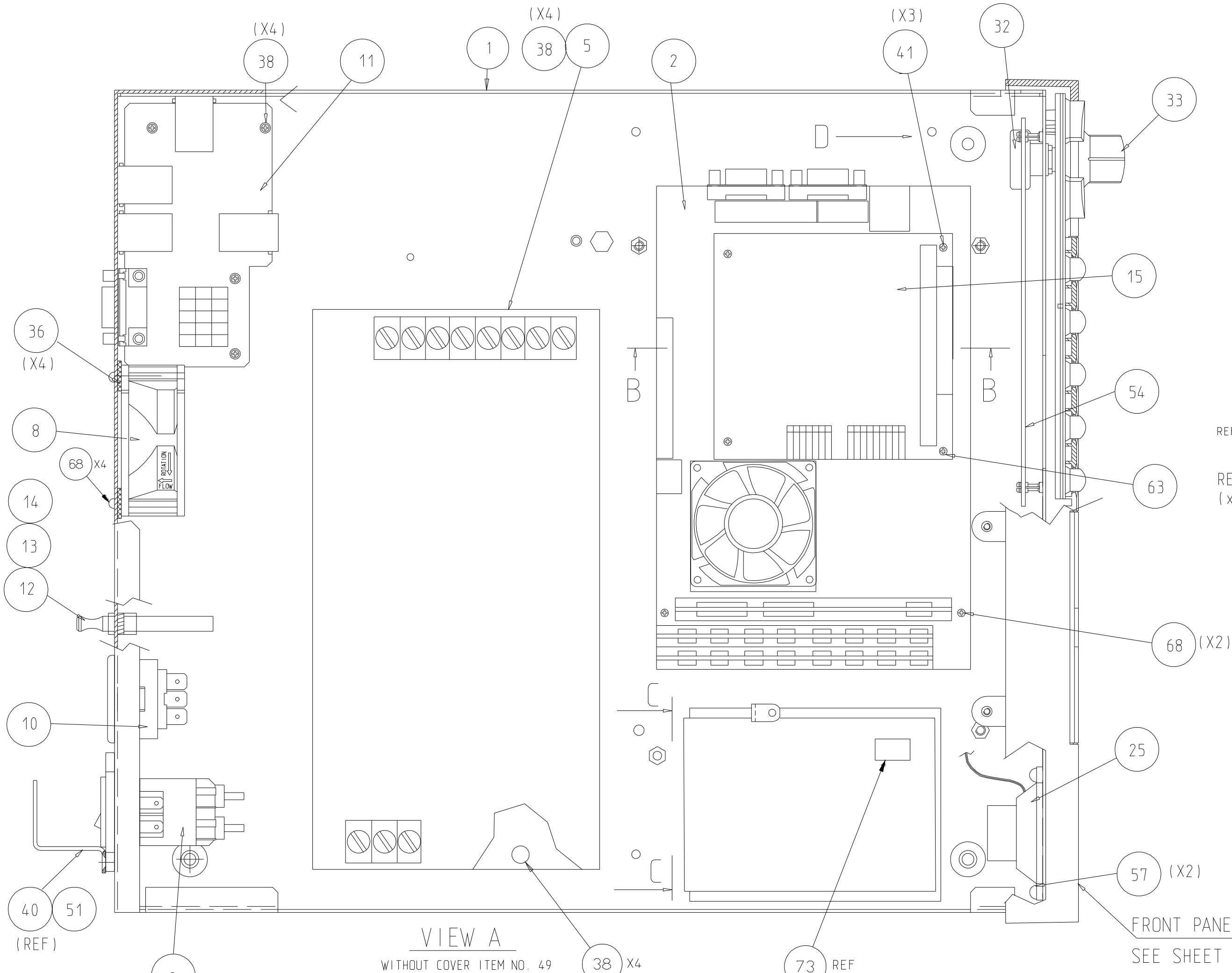
Description	**Part Number (P/N)**	
	DRAWING	BILL OF MATERIAL (BM)
MAIN PROCESSING UNIT, TYPE II – TOP ASSEMBLY	554-000-000	554-000-000
SINGLE MODULES: TOP ASSEMBLY		
ECG MODULE – TOP ASSEMBLY	551-101-000	551-101-000
ECG MULTI LEAD MODULE – TOP ASSEMBLY	551-103-000	551-103-000
2 BP/CO MODULE - TOP ASSEMBLY	551-107-000	551-107-000
2 BP MODULE – TOP ASSEMBLY	551-108-000	551-108-000
CO/2 TEMP. MODULE - TOP ASSEMBLY	551-109-000	551-109-000
TWO TEMP. MODULE – TOP ASSEMBLY	551-110-000	551-110-000
NIBP MODULE – TOP ASSEMBLY	551-130-000	551-130-000
SPO2 MODULE – TOP ASSEMBLY	551-131-000	551-131-000
ETCO2 MODULE - TOP ASSEMBLY	551-133-000	551-133-000
REMOTE CONTROL – MCU ASSEMBLY.	551-160-000	551-160-000
MODULE RACK – 6 MODULES: TOP ASSEMBLY	553-000-000	553-000-000
ECG 12 LEAD - TOP ASSEMBLY	551-105-000	551-105-000
ETCO2 SINGLE - TOP ASSEMBLY	551-135-000	551-135-000
UNIPORT - TOP ASSEMBLY	551-145-000	551-145-000

1 Main Processing Unit Type II – Top Assembly

Bill of Material (554-000-000) – Rev. H

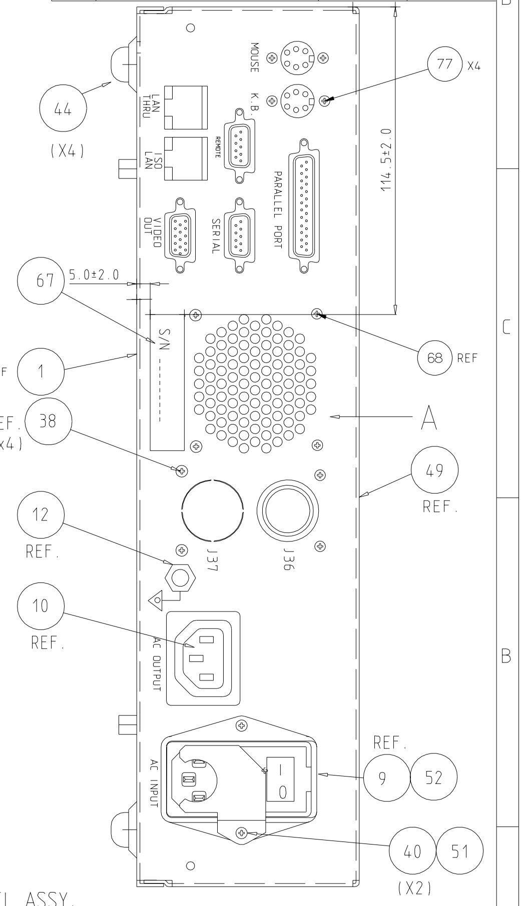
Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF: tp 554-000-000 rev. a ap 554-000-000 rev. a hds 554-000-000 rev. a srd 554-000-000 rev. a ecn 7752-rev. a ecn 7787-rev. b ecn 7893-rev. c ecn 7848-rev. d ecn 7929-rev. e ecn 8219-rev. f ECN 8335-REV .G SRD 554-400-000 REv.. D ECN 8402-REV. H						
001	554-501-010	e	base-b.s monitor (type ii)	ea	1	s
002	146-017-060	a	pcba-mother 686lcd/s (with sound blaster	ea	1	b
003	116-107-850		socket strip 64p double row	ea	1	b
004	116-107-851		socket stip 40p double row	ea	1	b
005	108-020-034		poser supply dc	ea	1	b
006	554-101-010	b	*hard disk with envoy software and bracket	ea	1	m
008	554-110-000	a	*fan assy	ea	1	m
009	554-206-030	b	*ac input module-assy	ea	1	m
010	102-206-010		ac appliance outlet	ea	1	b
011	554-202-000	-	*pcba-video/isolation lan board ii	ea	1	m
012	116-013-050		gun stud din type poag-s 6/35	ea	1	b
013	135-105-360		washer star f/m6	ea	8	b
014	133-100-361		nut mu 0.8 d/m6	ea	3	b
015	554-205-000	a	*pcba-pc 104 comm.	ea	1	m
016	554-303-016		*cable inlet to power supply gpm 130	ea	1	m
017	554-303-011	-	*cable assy int. cable 110w power supply, ter	ea	1	m
018	554-304-017	a	*cable assy keybouard cable	ea	1	m
019	554-303-014	d	*cable assy-int. cable main power distribution			
021	554-304-011	a	*cable assy-mcu/splitter to com2	ea	1	b
022	554-304-012	a	*cable assy-parallel port envoy cpu	ea	1	m
023	554-304-014	a	*cable assy-lan thru int. cable	ea	1	m
025	554-304-016	d	*cable assy int.-cable spearker to sound blaster	ea	1	m
026	554-305-011	-	*cable assy cpu-vga vieo output	ea	1	m
027	120-010-005	-	lbl-“gnd symbol”	ea	1	s
028	554-601-000	c	front panel-b.s. monitor	ea	1	s
029	554-602-000	a	rubber keypad b.s. monitor	ea	1	s
030	554-203-000	-	pcba-key pad, flex board	ea	1	s
031	554-510-000	a	plate, support keypad	ea	1	s
032	127-115-500		sw optical encoder, 24 pos w-nit	ea	1	b
033	554-603-000	a	knob, trim	ea	1	s
034	554-604-000	-	pipe, light b.s. monitor	ea	1	s
035	554-605-000	c	door-pcmcia	ea	1	s
036	135-114-100	b	washer-sponge .50 od .188 id .125 t	ea	4	b
037	134-144-104		screw 4-14x1/4 plt-30 ph phil stl	ea	10	b
038	134-102-008		screw 6-32x1/4 ph phil ss	Ea	18	b
039	134-100-009		screw 2-56x1/4 ph phil ss	ea	2	b
040	134-301-500		screw 4-40x3/8 fh 82d stl	ea	2	b
041	134-101-013		screw 4-40x1/4 ph phil ss	ea	9	b
042	133-100-021		nut-hex 6-32 thd small	ea	4	b
043	133-100-012		nut-hex 4-40 thd small	ea	2	b
044	118-020-003		rubber foot-screw 6-32	ea	4	b
045	112-113-250		glue, identicol-orange or purple	ea	0	b
047	131-103-015		clamp adhesive backded mounting	ea	1	b
048	131-101-270		clamp-tie wrap sstim-m	ea	4	b
049	554-502-000	a	*cover-b.s. monitor type i	ea	1	s
050	554-701-000	b	label-b.s. monitor	ea	1	s
051	241-593-010	a	bkt-line cord retainer	ea	1	s
052	102-180-130		fuse slo blo 5x20 mm 3.15a 250 vac	ea	2	b
053	135-102-030		washer-flat #6	ea	5	b
054	554-201-000	a	*pcba-mpu and rs 232 splitter	ea	1	m
055	554-511-000	-	bracket, pcmcia support	ea	1	a
057	134-101-006		screw 4-40x3/16 ph stl	ea	2	b
059	131-103-019		clip, press, half, adhesive backed	wa	2	b
060	124-051-623		st, hex, 3/16, 4-40x1”5/16, m/f, brass	ea	4	b
061	124-051-621		stand off, 3/16 hex, 5/8”x4-40, m/f, al	ea	4	b
062	554-701-002		label “keyboard”	ea	0	s
063	134-104-013		screw 4-40x1/4”, sems, ph, phil, stl, zinc	ea	1	b
064	108-020-035		cover to power supply gpm-130a-t	ea	1	b
065	135-101-020		washer-split lock #4	ea	2	b
066	146-022-001		pcb adapter for 2.5” ide drive	ea	1	b
067	554-701-001	-	label s/n (for bedside monitor)	ea	1	s
068	134-101-036		screw – 4-40x3/8 ph phil ss	ea	2	b
069	554-304-018	-	*cable assy for mpu remote	ea	1	m
070	554-701-004	-	label “remote”	ea	4	b
071	134-102-057		screw 6-32x1 11.4 ph ss			

A	ECN 7752		
B	ECN 7787		
C	ECN 7893		
D	ECN 7848		
E	ECN 7929		
F	ECN 8219		
G	ECN		
H	ECN 8402		
I	ECN		
J	ECN 8597		


(X4)
38
11
(X4)
1
38
5
2
(X3)
41
32
33
D
15
B
B
54
63
68 (X2)
36
(X4)
8
68 X4
ROTATION
FLOW
14
13
12
10
C
C
25
57 (X2)
40
51
(REF)
9
38 X4
73 REF
FRONT PANEL ASSY.
SEE SHEET NO. 3.

VIEW A

WITHOUT COVER ITEM NO. 49


MOUSE
K.B.
77 X4
114.5±2.0
PARALLEL PORT
REMOTE
SERIAL
VIDEO OUT
LAN THRU
ISO LAN
44
(X4)
67
5.0±2.0
S/N ________
68 REF
REF
1
A
REF.
38
(x4)
49
REF.
12
REF.
J37
J36
10
REF.
AC OUTPUT
AC INPUT
REF.
9
52
40
51
(X2)

NOTES:
1. START ASSEMBLING WITH THOSE ITEMS ASSEMBLED ON THE FRONT AND REAR WALLS.

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FAX : 972-8-406519

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DESIGN	Dudi B	10.97
DRAWIN	Dudi B	10.97
CHECK	YURI R.	23.03.00
PROJ. ENGER.		
Q . C	AVISHAY S.	23.03.00
RELEASE FOR PRODACTION		
DATE	BY	

MATERIAL :

DESCRIPTION :

MAIN COMPUTER UNIT-"ENVOY"

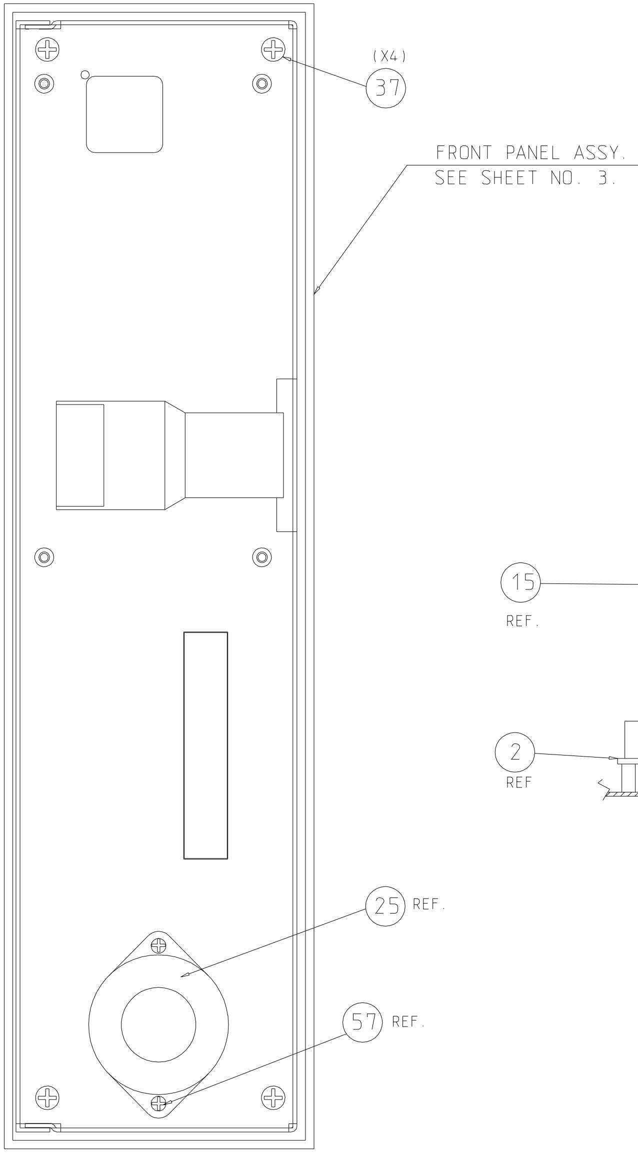
FINISH :

PART No : 554-000-000

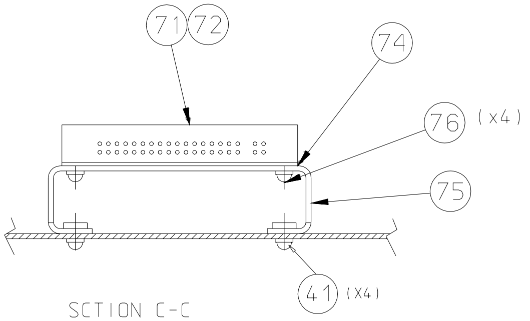
BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

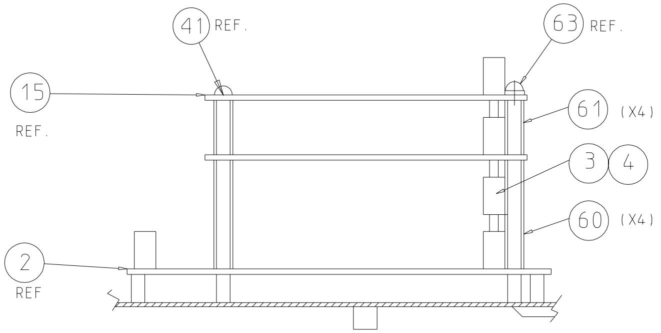
SCALE : 1:2
SHEET 1 OF 4
SIZE A3
SURFACE ROUGH. √
DIMENSIONS : mm
REV. J


(X4)
37
FRONT PANEL ASSY.
SEE SHEET NO. 3.
25 REF.
57 REF.

VIEW D


71
72
74
76 (x4)
75
41 (X4)

SCTION C-C
ROTATED 90° C.C.W.


41 REF.
63 REF.
15
REF.
61 (X4)
3
4
60 (X4)
2
REF

SCTION B-B

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P.O.B. 102, REHOVOT 76100, ISRAEL
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FAX : 972-8-406519

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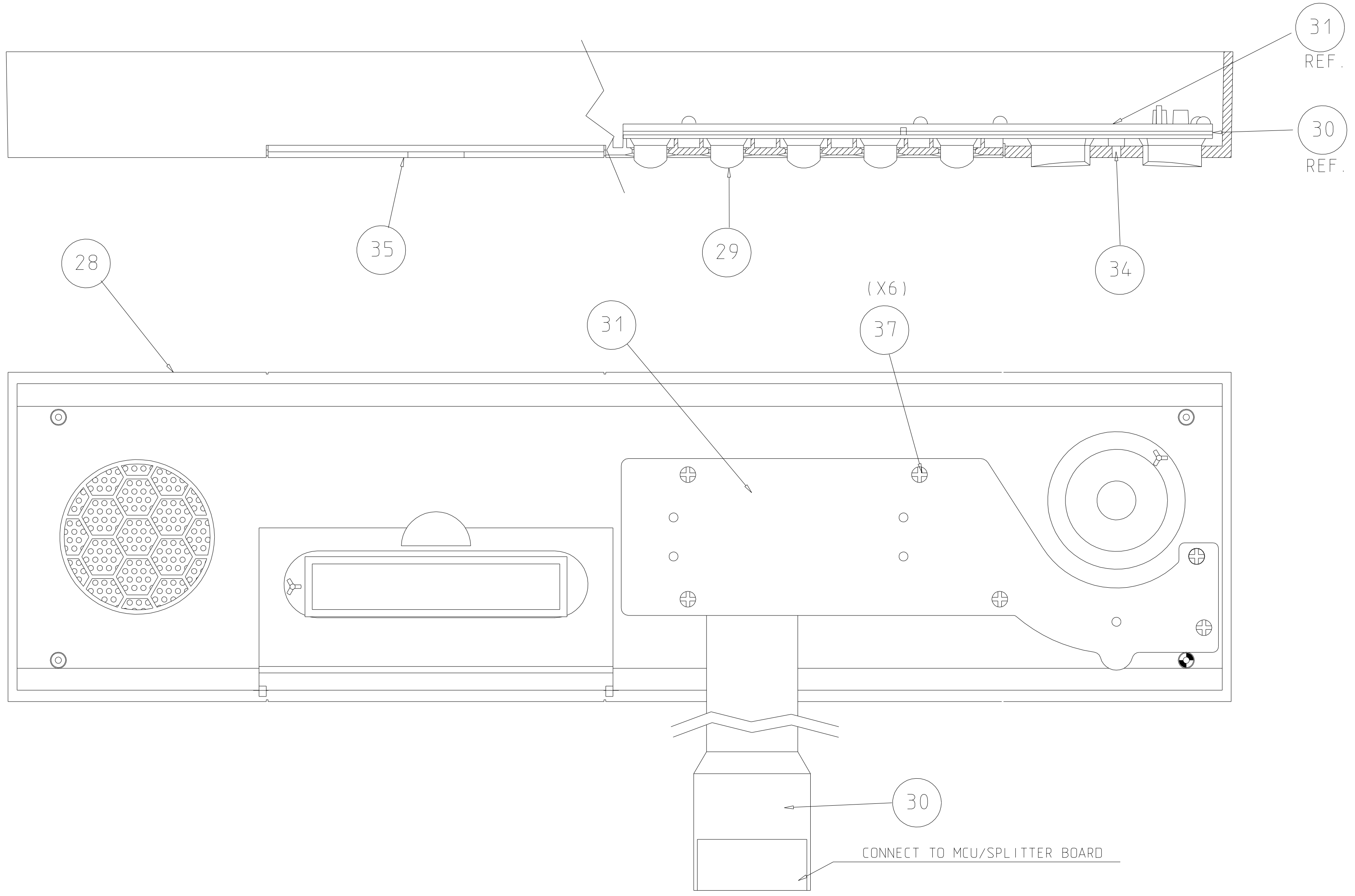
MAIN COMPUTER UNIT,TOP ASSY
PART No 554-000-000
SIZE A3
SCALE : 1 : 2
SHEET 2 OF 4
REV. J


31
REF.
30
REF.
35
29
34
28
(X6)
31
37
30
CONNECT TO MCU/SPLITTER BOARD

KIRYAT WEIZMANN SCIENCE PARK
P.O.B. 102, REHOVOT 76100, ISRAEL
TEL : 972-8-383030
FAX : 972-8-406519

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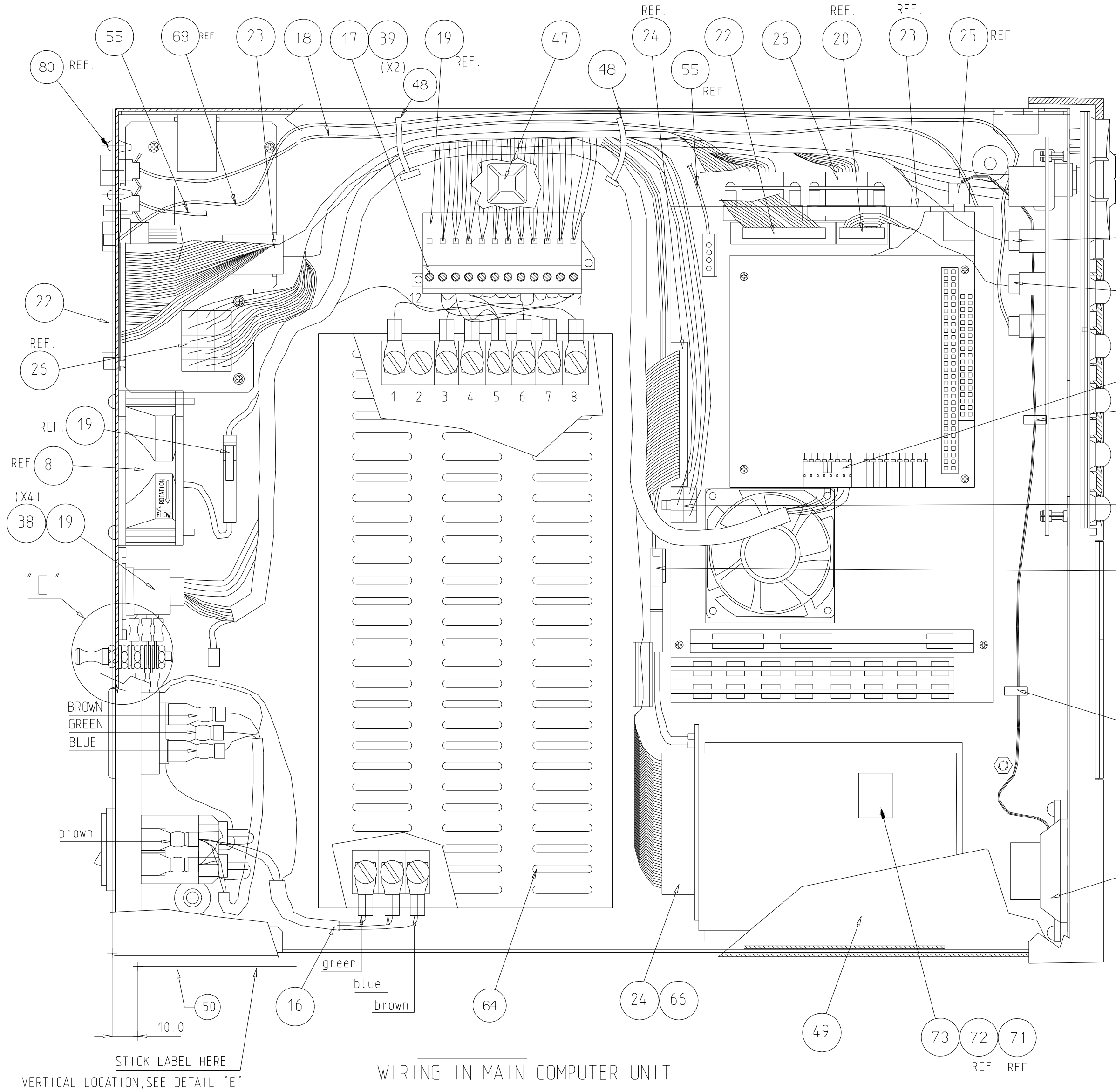
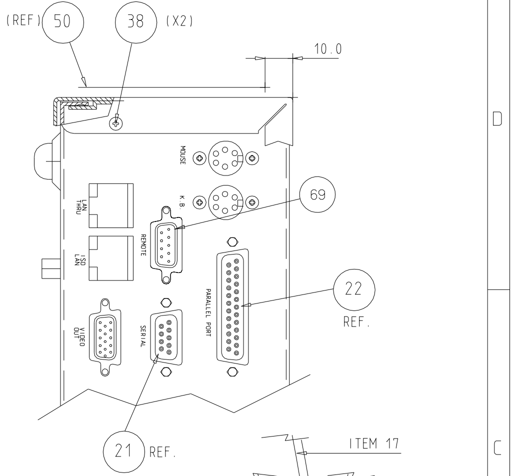
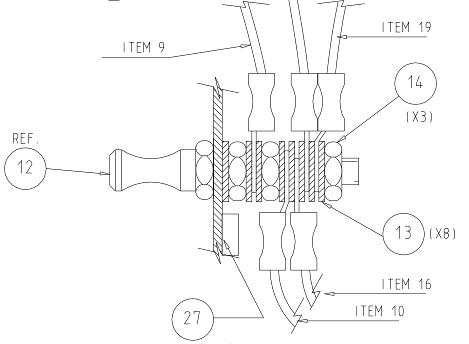
BED SIDE CU,TYPE II-TOP ASSY

PART No 554-000-000
SIZE A3
SCALE : 1:2
SHEET 3 OF 4
REV. J


80 REF.
55
69 REF
23
18
17
39 (X2)
48
19 REF.
47
48
24 REF.
55 REF
22
26
20 REF.
23 REF.
25 REF.
21
20
19 REF.
59 REF.
19 REF.
19 REF.
59 (X2)
25 REF.
22
26 REF.
19 REF.
8 REF
38 (X4)
19
"E"
12
1 2 3 4 5 6 7 8
ROTATION FLOW
BROWN
GREEN
BLUE
brown
green
blue
brown
16
64
24 66
49
73 72 71
REF REF
50
10.0
STICK LABEL HERE
VERTICAL LOCATION,SEE DETAIL 'E'

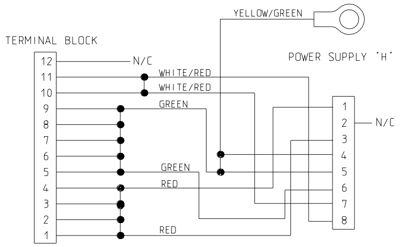
WIRING IN MAIN COMPUTER UNIT


(REF) 50
38 (X2)
10.0
MOUSE
K.B.
LAN THRU
ISD LAN
REMOTE
69
PARALLEL PORT
22 REF.
VIDEO OUT
SERIAL
21 REF.


ITEM 17
ITEM 19
ITEM 9
14 (X3)
12 REF.
13 (X8)
ITEM 16
ITEM 10
27
GLUE LABEL 'GND'

DETAIL E

SCALE 2.5:1


TERMINAL BLOCK
12
11
10
9
8
7
6
5
4
3
2
1
N/C
WHITE/RED
WHITE/RED
GREEN
GREEN
RED
RED
YELLOW/GREEN
POWER SUPPLY 'H'
1
2
3
4
5
6
7
8
N/C

WIRING DIAGRAM

BETWEEN TERMINAL BLOCK TO POWER SUPPLY

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MAIN COMPUTER UNIT-TOP ASSY

PART No 554-000-000

SIZE A3

SCALE : 1:2

SHEET 4 OF 4

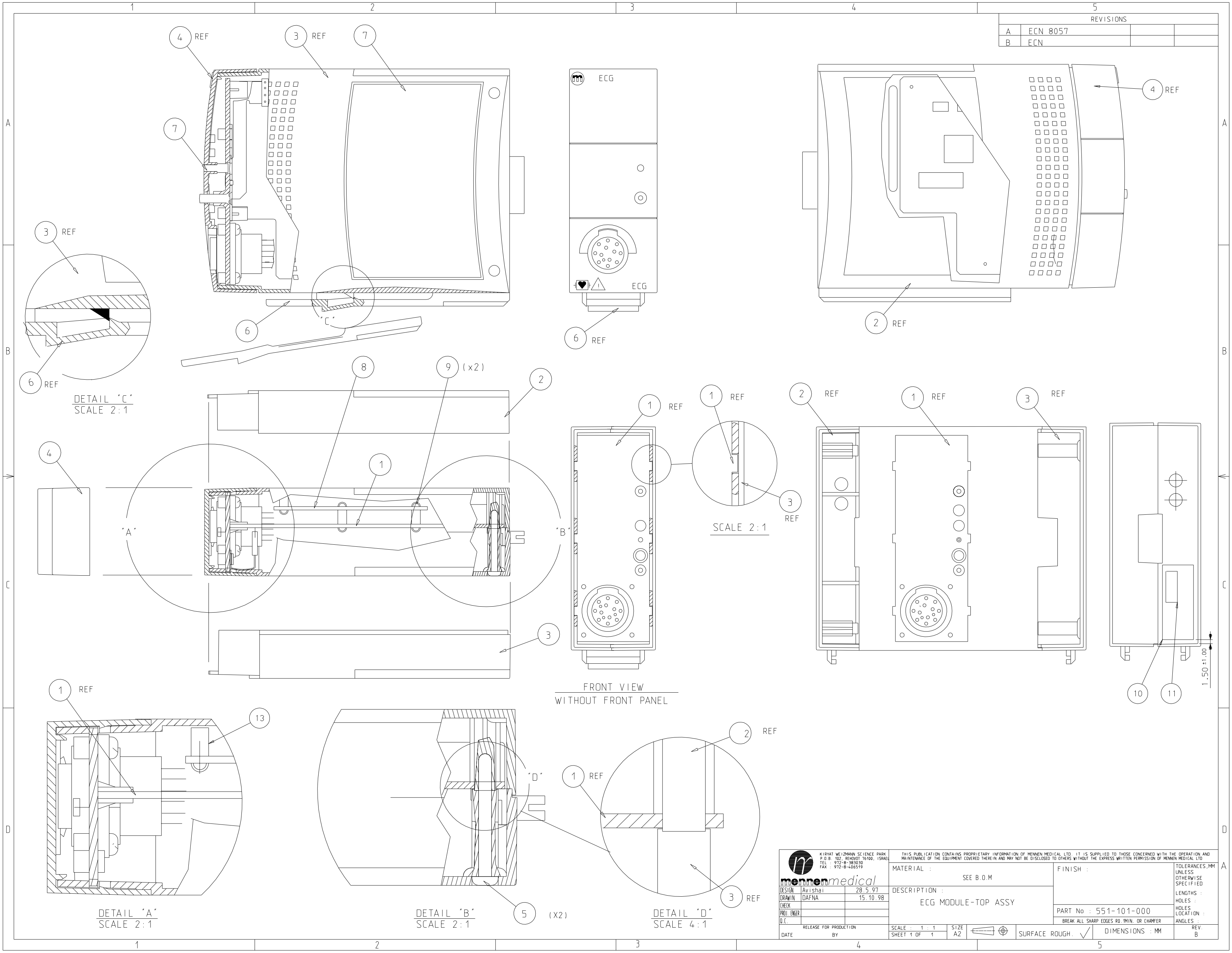
REV. J

2 Module ECG 3 Leads – Top Assembly

Bill of Material (551-101-000) REV. B

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF: ECN 8057 REV. A ECN 8286 REV. B						
001	551-201-000		PCBA-3/5/6 LEAD ECG	EA	1	M
002	551-616-000		LEFT SIDE, SHORT	EA	1	S
003	551-615-000		RIGHT SIDE, SHORT	EA	1	S
004	551-601-102		FRONT PANEL-ECG 3 LEADS/RESP.	EA	1	S
005	134-715-019		SCREW, ST K3STAR, 30X30	EA	2	B
006	551-619-000		LATCH	EA	1	S
007	551-605-010		PIPE LIGHT (MIDDLE)	EA	1	S
008	551-200-000		PCBA-PROCESSING & STORAGE BLOCK (P&SB)	EA	1	M
009	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	EA	2	B
010	551-701-101		LABEL-ECG 3L	EA	1	S
013	124-015-048		TEARDROP CIRCUIT BOARD SUPPORT, SPACER PST ¼	EA	1	B

REVISIONS			
A	ECN 8057		
B	ECN		



1
2
3
4
5
A
B
C
D
4 REF
3 REF
7
7
3 REF
6
'C'
6 REF
DETAIL 'C'
SCALE 2:1
ECG
ECG
6 REF
4 REF
2 REF
8
9 (x2)
2
1
4
'A'
'B'
3
1 REF
1 REF
3 REF
SCALE 2:1
FRONT VIEW
WITHOUT FRONT PANEL
2 REF
1 REF
3 REF
1.50±1.00
10
11
1 REF
13
DETAIL 'A'
SCALE 2:1
'D'
5
(X2)
DETAIL 'B'
SCALE 2:1
1 REF
2 REF
3 REF
DETAIL 'D'
SCALE 4:1

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DESIGN	Avishai	28.5.97
DRAWIN	DAFNA	15.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL : SEE B.O.M

DESCRIPTION : ECG MODULE-TOP ASSY

FINISH :

PART No : 551-101-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

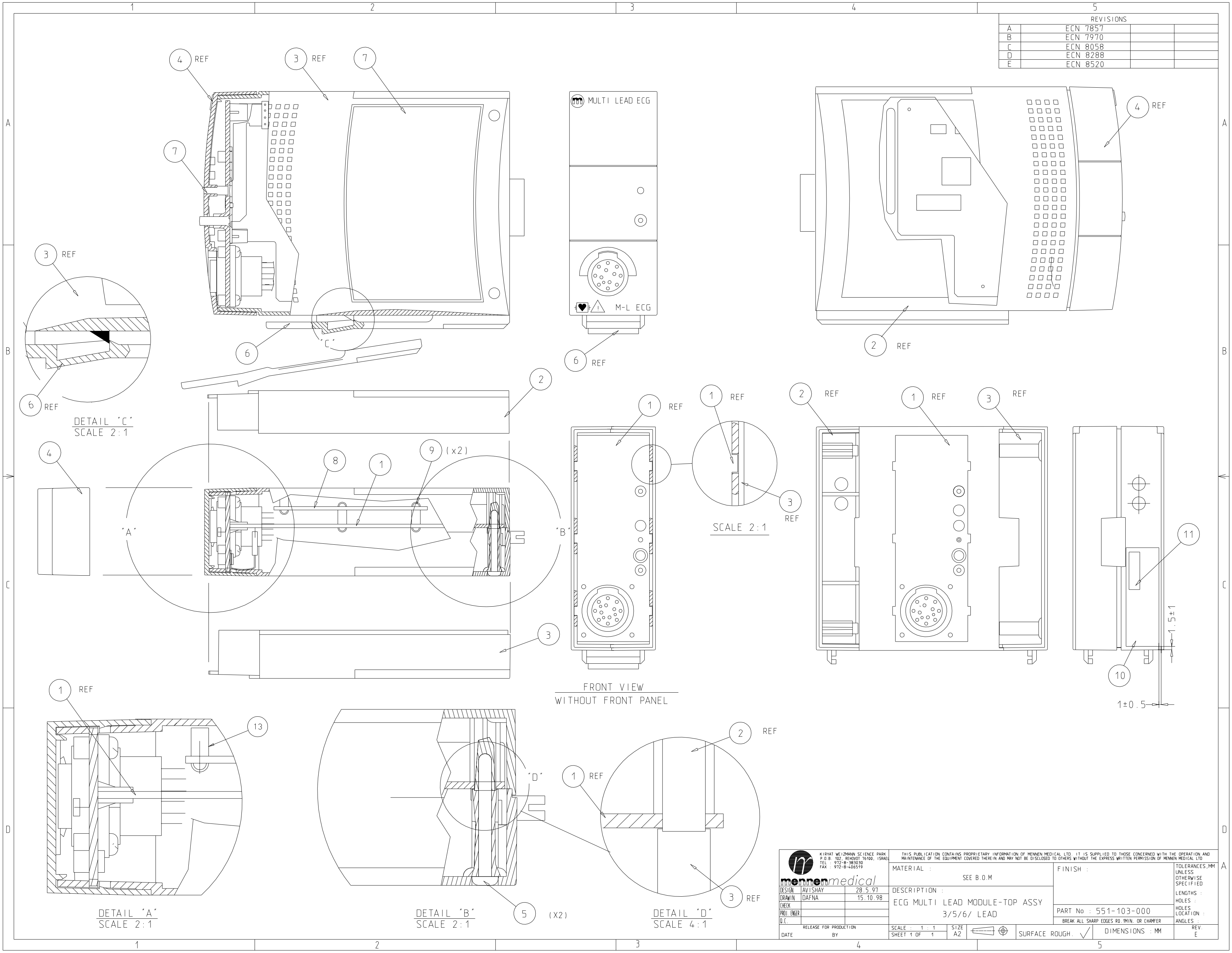
TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. B

3 Module ECG 3/5/6 Leads – Top Assembly

Bill of Material (551-103-000) REV. D

Desq.	***Item no.***	***Rev.***	***Description***	***Unit***	***Qty***	***SR***
REF:	AP 551-103-000 REV. A TP 551-103-000 REV. C SRD 551-401-000 REV. D ECN 7857 REV. A ECN 7970 REV. B ECN 8058 REV. C ECN 8288 REV. D					
001	551-201-000		PCBA-3/5/6 LEAD ECG	EA	1	M
002	551-616-000		LEFT SIDE, SHORT	EA	1	S
003	551-615-000		RIGHT SIDE, SHORT	EA	1	S
004	551-601-103		FRONT PANEL-ECG 3,5,6 LEADS	EA	1	S
005	134-715-019		SCREW, ST K3STAR, 30X30	EA	2	B
006	551-619-000		LATCH	EA	1	S
007	551-605-010		PIPE LIGHT (MIDDLE)	EA	1	S
008	551-200-000		PCBA-PROCESSING & STORAGE BLOCK (P&SB)	EA	1	M
009	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	EA	2	B
010	551-701-103		LABEL-ECG M. L MODULE	EA	1	S
011	551-702-103		LABEL-SOFTWARE REVISION	EA	1	S
012	551-401-000		3/5/6 LEAD ECG+ARRHYTHMIA & ST SOFTWARE	EA	1	S
013	124-015-048		TEARDROP CIRCUIT BOARD SUPPORT, SPACER PST ¼	EA	1	B


4 REF
3 REF
7
7
MULTI LEAD ECG
M-L ECG
6 REF
4 REF
2 REF
3 REF
6
'C'
6 REF
DETAIL 'C'
SCALE 2:1
2
4
'A'
8
1
9 (x2)
'B'
3
1 REF
1 REF
3 REF
SCALE 2:1
FRONT VIEW
WITHOUT FRONT PANEL
2 REF
1 REF
3 REF
11
1.5±1
10
1±0.5
1 REF
13
DETAIL 'A'
SCALE 2:1
'D'
5 (X2)
DETAIL 'B'
SCALE 2:1
2 REF
1 REF
3 REF
DETAIL 'D'
SCALE 4:1
1
2
3
4
5
A
B
C
D

REVISIONS			
A	ECN 7857		
B	ECN 7970		
C	ECN 8058		
D	ECN 8288		
E	ECN 8520		

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DESIGN	AVISHAY	28.5.97
DRAWIN	DAFNA	15.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL : SEE B.O.M

DESCRIPTION : ECG MULTI LEAD MODULE-TOP ASSY 3/5/6/ LEAD

FINISH :

PART No : 551-103-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1

SIZE A2

SURFACE ROUGH. √

DIMENSIONS : MM

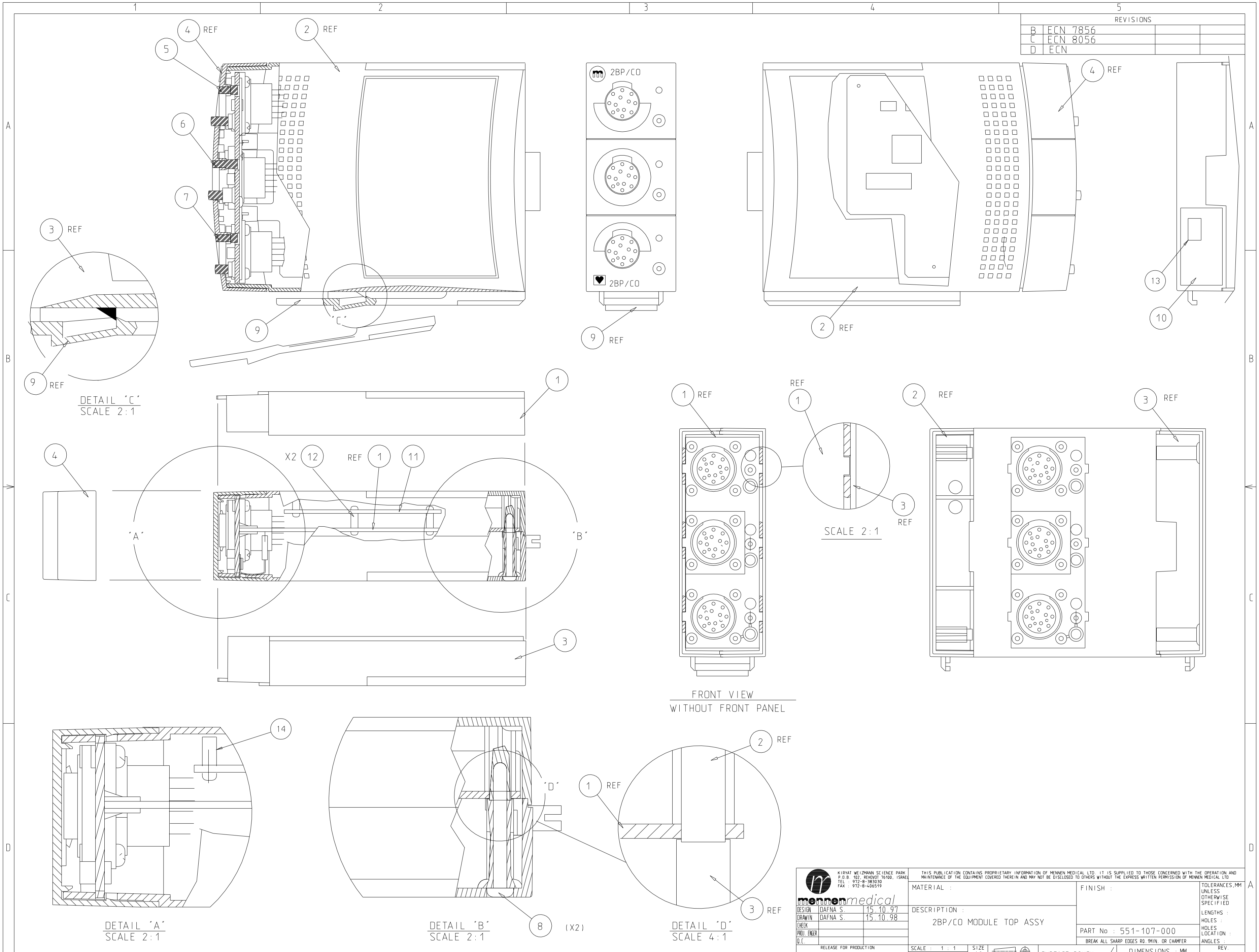
REV. E

4 Module 2BP/CO – Top Assembly

Bill of Material (551-107-000) REV. C

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF:	AP 551-107-000 REV. A TP 551-107-000 REV. C SRD 551-407-000 REV. D HDS 551-107-000 REV. - ECN 7791 REV. A ECN 7856 REV. B ECN 8056 REV. C					
001	551-207-000		PCBA-2 BLOOD PRESSURE/CARDIAC OUTPUT	EA	1	M
002	551-616-000		LEFT SIDE, SHORT	EA	1	S
003	551-615-000		RIGHT SIDE, SHORT	EA	1	S
004	551-601-107		FRONT PANEL-2BP/CO	EA	1	S
005	551-605-000		LIGHT PIPE, (UPPER)	EA	1	S
006	551-605-010		PIPE LIGHT (MIDDLE)	EA	1	S
007	551-605-020		PIPE LIGHT (BOTTOM)	EA	1	S
008	134-715-019		SCREW, ST K3STAR, 30X30	EA	2	B
009	551-619-000		LATCH	EA	1	S
010	551-701-107		LABEL-2BP/CO MODULE	EA	1	S
011	551-200-000		PCBA-PROCESSING & STORAGE BLOCK (P&SB)	EA	1	M
012	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	EA	2	B
013	551-702-103		LABEL-SOFTWARE REVISION	EA	1	S
014	124-015-048		TEARDROP CIRCUIT BOARD SUPPORT, SPACER PST ¼	EA	1	B
022	551-407-000		2BP/CO SOFTWARE	EA	1	m

REVISIONS			
B	ECN 7856		
C	ECN 8056		
D	ECN		


4 REF
2 REF
5
6
7
3 REF
9
'C'
9 REF
DETAIL 'C'
SCALE 2:1
2BP/CO
2BP/CO
9 REF
4 REF
2 REF
13
10
1
4
X2
12
REF
1
11
'A'
'B'
3
1 REF
REF
1
3 REF
SCALE 2:1
2 REF
3 REF
FRONT VIEW
WITHOUT FRONT PANEL
14
'D'
8
(X2)
2 REF
1 REF
3 REF
DETAIL 'A'
SCALE 2:1
DETAIL 'B'
SCALE 2:1
DETAIL 'D'
SCALE 4:1
1
2
3
4
5
A
B
C
D

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DESIGN	DAFNA S.	15.10.97
DRAWIN	DAFNA S.	15.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

DESCRIPTION :
2BP/CO MODULE TOP ASSY

FINISH :

PART No : 551-107-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

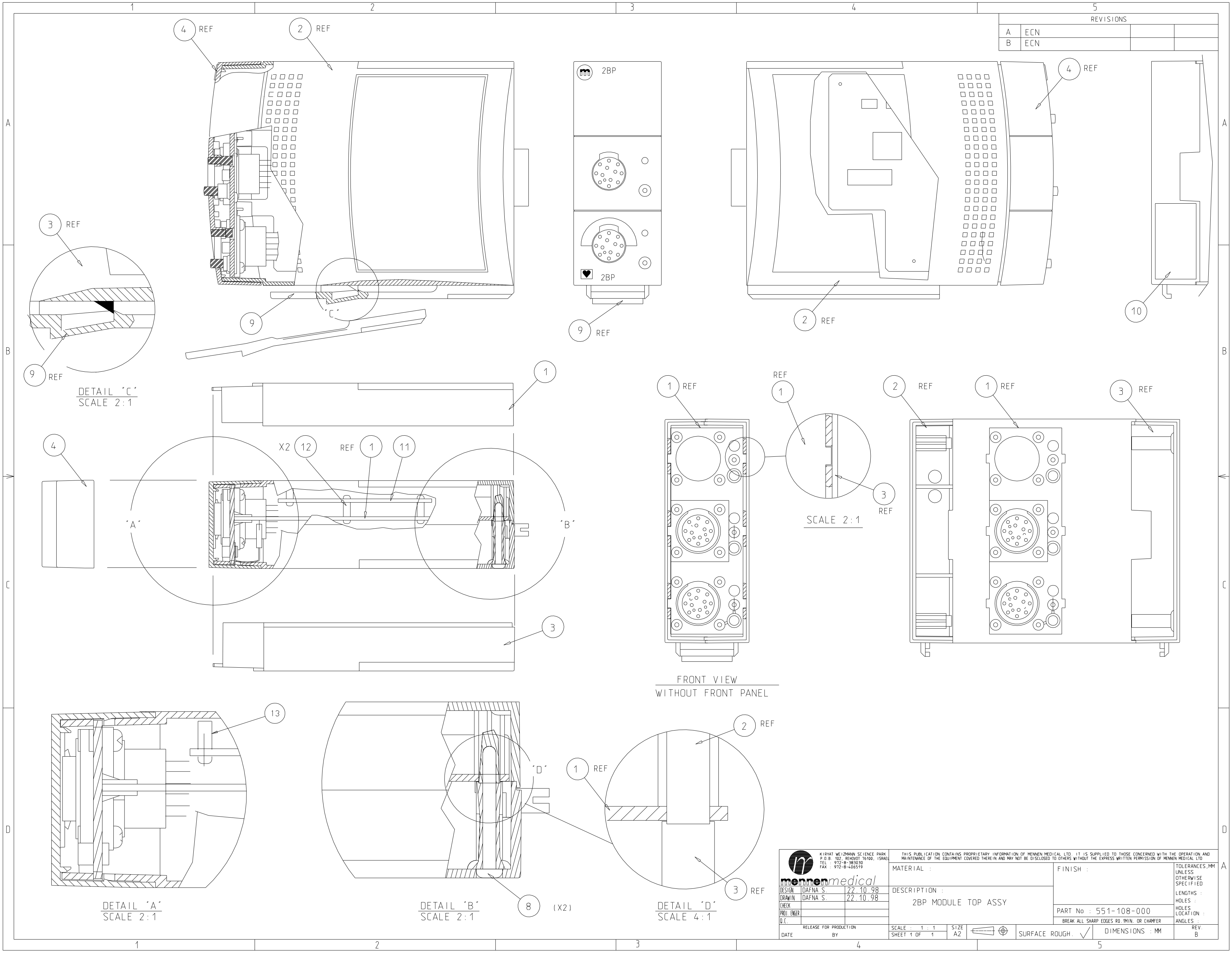
TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. D

5 Module 2BP Module Top Assembly

Bill of Material (551-108-000) REV. B

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF:	TP 551-108-000 REV. - SRD 551-408-000 REV. b ECN 8290 REV. A ECN 8347 REV. B					
001	551-228-000		PCBA-2 BP INTERFACE	EA	1	M
002	551-616-000		LEFT SIDE, SHORT	EA	1	S
003	551-615-000		RIGHT SIDE, SHORT	EA	1	S
004	551-601-118		FRONT PANEL-2BP	EA	1	S
008	134-715-019		SCREW, ST K3STAR, 30X30	EA	2	B
009	551-619-000		LATCH	EA	1	S
010	551-701-128		LABEL-2BP MODULE	EA	1	S
011	551-200-000		PCBA-PROCESSING & STORAGE BLOCK (P&SB)	EA	1	M
012	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	EA	2	B
013	124-015-048		TEARDROP CIRCUIT BOARD SUPPORT, SPACER PST ¼	EA	1	B
014	551-408-000		2BP SOFTWARE	EA	1	M


4 REF
2 REF
3 REF
9
'C'
9 REF
DETAIL 'C'
SCALE 2:1
2BP
2BP
9 REF
4 REF
2 REF
10
1
4
'A'
X2 12
REF 1
11
'B'
3
1 REF
REF 1
3 REF
SCALE 2:1
2 REF
1 REF
3 REF
FRONT VIEW
WITHOUT FRONT PANEL
13
DETAIL 'A'
SCALE 2:1
'D'
8 (X2)
DETAIL 'B'
SCALE 2:1
1 REF
2 REF
3 REF
DETAIL 'D'
SCALE 4:1
1
2
3
4
5
A
B
C
D

REVISIONS			
A	ECN		
B	ECN		

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DESIGN	DAFNA S.	22.10.98
DRAWIN	DAFNA S.	22.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

DESCRIPTION :
2BP MODULE TOP ASSY

FINISH :

PART No : 551-108-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

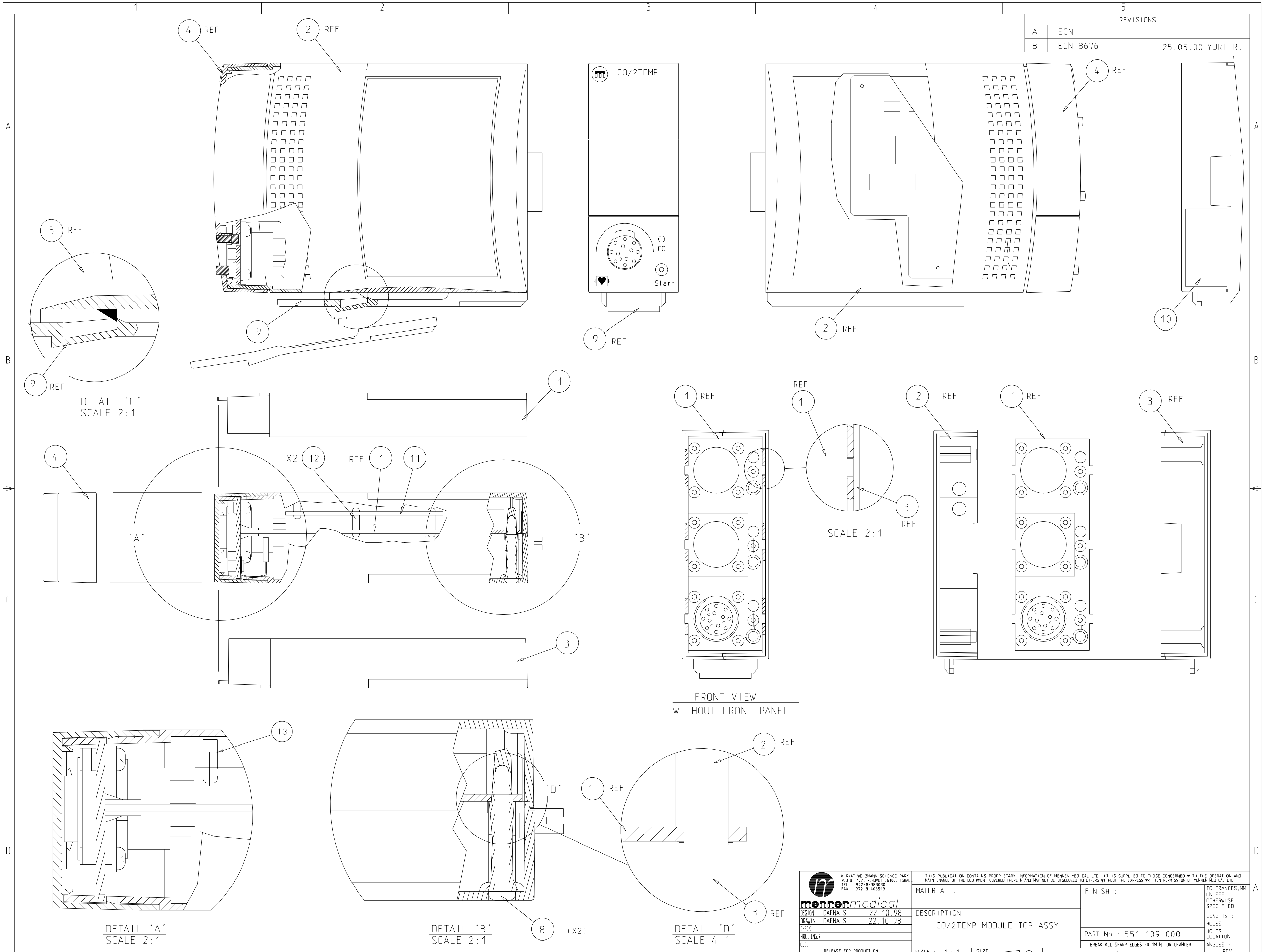
SCALE : 1 : 1
SHEET 1 OF 1
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. B

6 Module CO_2/Temp. – Top Assembly

Bill of Material (551-109-000) REV. A

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF:	TP 551-109-000 REV. – srd 551-409-000 rev. b ECN 8348 REV. A					
001	551-209-000		PCBA-CO 2 TEMP MODULE	EA	1	B
002	551-616-000		LEFT SIDE, SHORT	EA	1	S
003	551-615-000		RIGHT SIDE, SHORT	EA	1	S
004	551-601-119		FRONT-PANEL CO.	EA	1	S
007	551-409-000		SOFTWARE CO/2TEMP MODULE	EA	1	B
008	134-715-019		SCREW, ST K3STAR, 30X30	EA	2	B
009	551-619-000		LATCH	EA	2	S

REVISIONS			
A	ECN		
B	ECN 8676	25.05.00	YURI R.


4 REF
2 REF
CO/2TEMP
CO
Start
9 REF
4 REF
2 REF
10
3 REF
9
'C'
9 REF
DETAIL 'C'
SCALE 2:1
1
4
'A'
X2 12
REF 1
11
'B'
3
1 REF
REF 1
3 REF
SCALE 2:1
2 REF
1 REF
3 REF
FRONT VIEW
WITHOUT FRONT PANEL
13
'D'
1 REF
2 REF
3 REF
DETAIL 'A'
SCALE 2:1
DETAIL 'B'
SCALE 2:1
8 (X2)
DETAIL 'D'
SCALE 4:1

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FAX : 972-8-406519

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DESIGN	DAFNA S.	22.10.98
DRAWIN	DAFNA S.	22.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

FINISH :

DESCRIPTION :
CO/2TEMP MODULE TOP ASSY

PART No : 551-109-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1

SIZE A2

SURFACE ROUGH. √

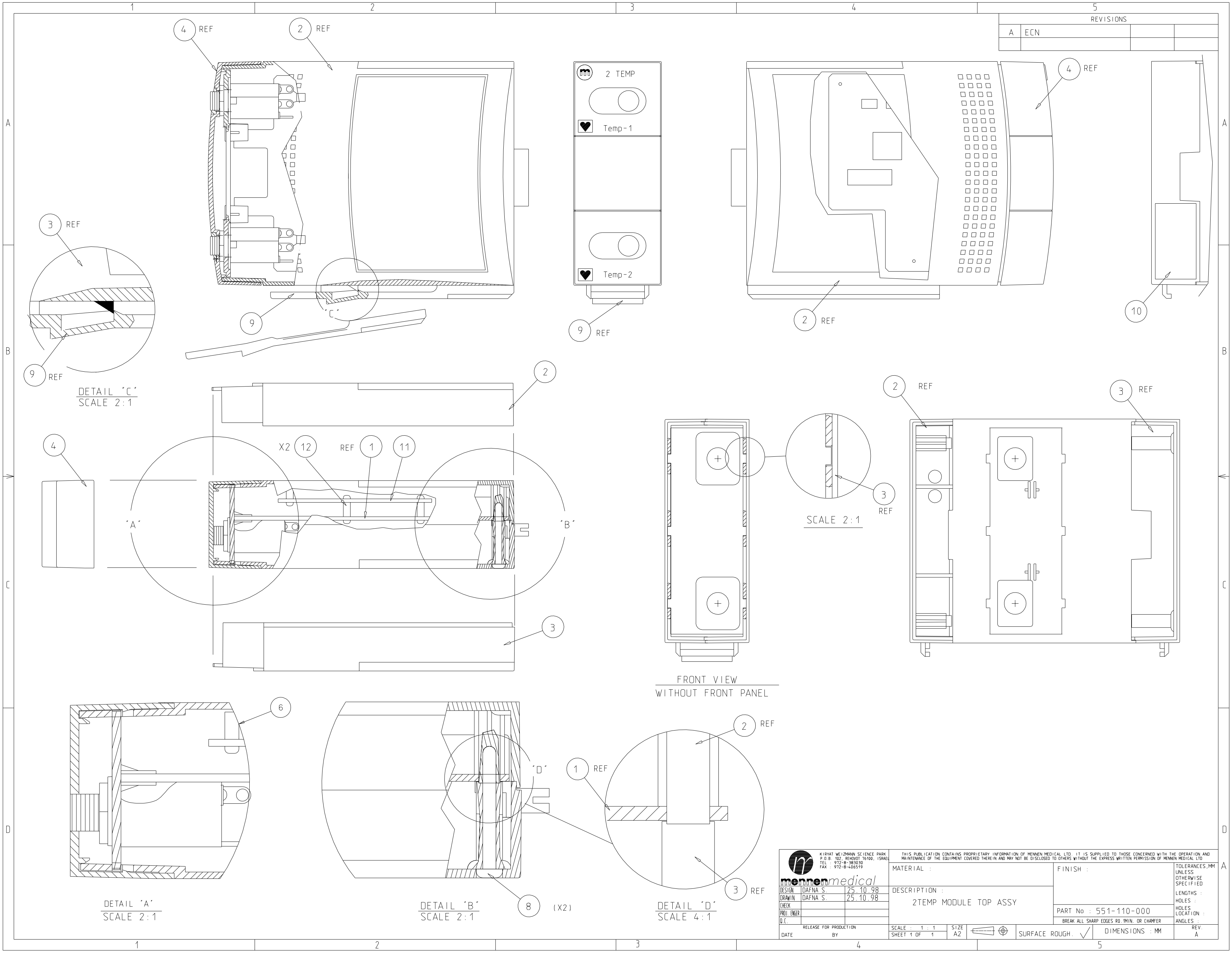
DIMENSIONS : MM

REV. B

7 Two Temp. Module – Top Assembly

Bill of Material (551-110-000) – REV. B

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF: 551-110-000 2 TEMP MODULE TOP ASSY 30.03.99 REV. A ECN 8289-REV. A ECN 8353 – REV. B SRD 551-410-000 REV. C						
001	551-210-000		PCBA- 2TEMP INTERFACE	EA	1	M
002	551-616-000	B	LEFT SIDE,SHORT	EA	1	S
003	551-615-000	A	RIGHT SIDE,SHORT	ea	1	S
004	551-601-110	A	FRONT PANEL-2TEMP	ea	1	s
006	124-015-048		TEARDROP CIRQUIT BOARD SUPPORT,SPACER PST 1	ea	1	b
009	551-619-000	b	LATCH	ea	1	s
010	551-701-110	a	LABEL-2TEMP MODULE	ea	1	s
011	551-200-000		PCBA- PROCESSING & STORAGE BLOCK (P&SB	ea	1	b
012	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	ea	2	b
013	551-410-000		2 TEMP SOFTWARE	ea	1	b


REVISIONS
A
ECN
4 REF
2 REF
3 REF
9 REF
9
'C'
DETAIL 'C'
SCALE 2:1
2 TEMP
Temp-1
Temp-2
9 REF
4 REF
2 REF
10
2
4
X2 12
REF 1
11
'A'
'B'
3
FRONT VIEW
WITHOUT FRONT PANEL
3 REF
SCALE 2:1
2 REF
3 REF
6
'D'
8
(X2)
1 REF
2 REF
3 REF
DETAIL 'A'
SCALE 2:1
DETAIL 'B'
SCALE 2:1
DETAIL 'D'
SCALE 4:1
1
2
3
4
5
A
B
C
D

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DESIGN	DAFNA S.	25.10.98
DRAWIN	DAFNA S.	25.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

FINISH :

DESCRIPTION :
2TEMP MODULE TOP ASSY

PART No : 551-110-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. A

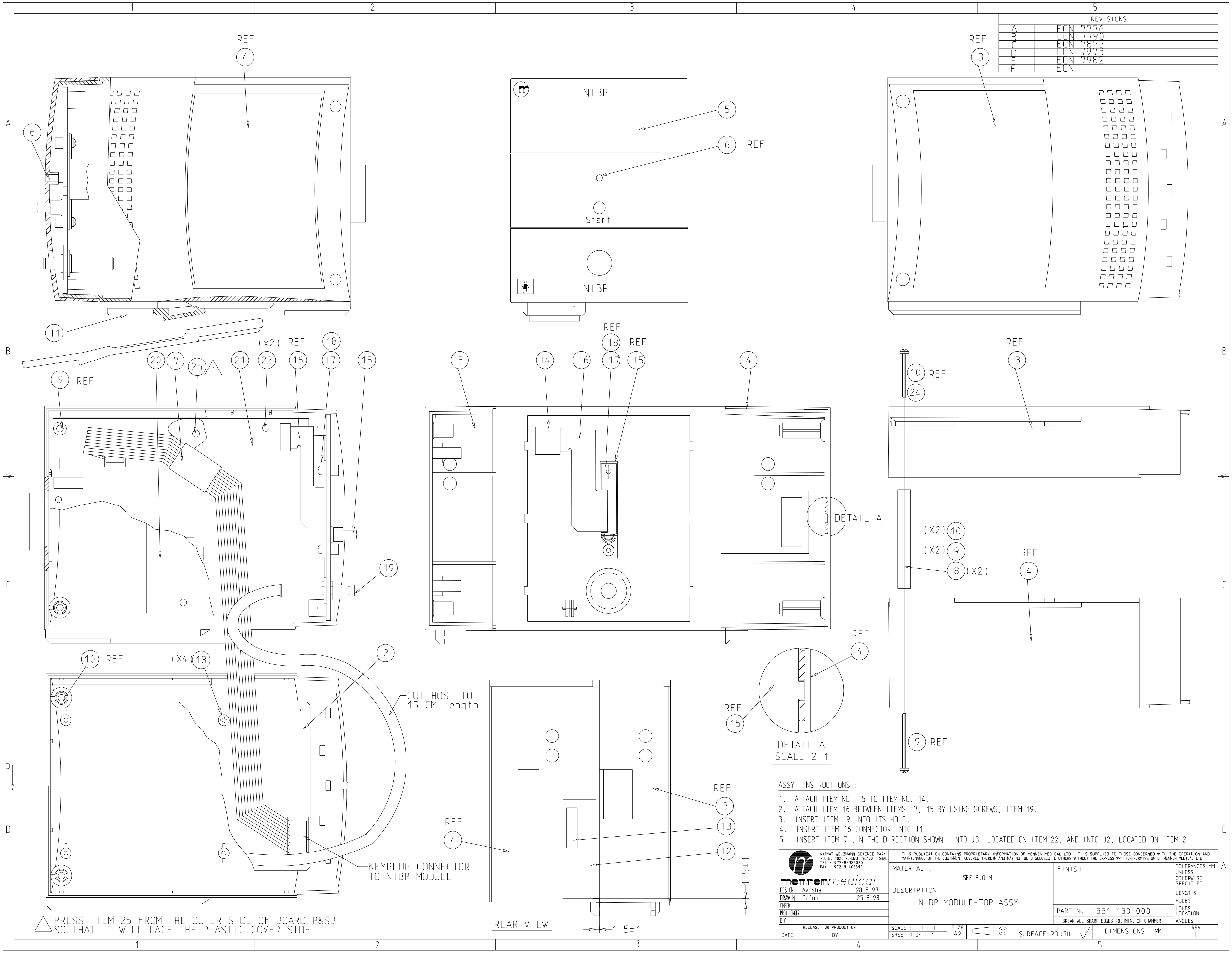
8 NIBP (“CAS”) Module – Top Assembly

Bill of Material (551-130-000) REV. F

Desg	Item no.	Rev	Description	Unit	Qty	SR
REF:	AP 551-130-000 REV. B TP 551-130-000 REV. C SRD 551-430-000 REV. B HDS 551-130-000 REV. - ECN 7776 REV. A ECN 7790 REV. B ECN 7853 REV. C ECN 7973 REV. D ECN 7982 REV. E ECN 8206 REV. F					
002	551-130-010		NB NON-INVASIVE BLOOD PRESSURE MODULE	EA	1	B
003	551-622-000		LEFT SIDE, NIBP (“CAS”)	EA	1	S
004	551-623-000		RIGHT SIDE, NIBP (“CAS”)	EA	1	S
005	551-602-130		FRONT PANEL, NIBP (“CAS”)	EA	1	S
006	551-605-010		PIPE LIGHT (MIDDLE)	EA	1	S
007	551-306-130		CABLE INTERFACE (“CAS”)	EA	1	m
008	124-090-027		standoff, hex, f/f 1-3/4 x 1/4-4-40,al	EA	2	B
009	134-101-060		screw-mach 4-40x5/8 ph phil ss	EA	2	b
010	134-101-112		screw 4-40x1 1/8 ph stl phil	EA	2	
011	551-619-000		latch	EA	1	s
012	551-701-130		label-nibp module	EA	1	s
013	551-430-000		nibp (“cas”) module software	EA	0.001	m
014	551-614-000		partition, nibp	EA	1	s
015	551-608-000		rubber k. b. (one key)	EA	1	S
016	551-220-000		flex, key pad (nibp “cas”)	ea	1	b
017	551-502-000		plate, k. b. (one key)	ea	1	s
018	134-144-104		screw 4-14 x1/4 plt-30 ph phil stl	ea	6	b
019	199-104-401		plug, air connector, 3mm hose tail	ea	1	b
020	551-200-000		pcba-processing & storage block (p&sb)	ea	1	m
021	551-223-000		pcba-nibp (“cas”) interface	ea	1	m
022	124-015-045		spacer pcb snap in both side 1/4l ny	ea	2	b
023	551-702-103		label, software revision	ea	1	s
024	112-113-250		glue, indenticol-orange or purple	ea	0.001	b
025	124-015-049		teardrop circuit board support 7/16”	ea	1	b

Figure 8-21. . NIBP (“CAS”) Module – Top Assembly [551-130-000]

REVISIONS	
A	ECN 7776
B	ECN 7790
C	ECN 7853
D	ECN 7973
E	ECN 7982
F	ECN


REF
4
6
11
NIBP
5
6
REF
Start
NIBP
REF
3
9
REF
20
7
25
1
21
(x2)
22
REF
16
18
17
15
19
3
14
16
REF
18
17
REF
15
4
DETAIL A
10
REF
24
REF
3
(X2)
10
(X2)
9
8
(X2)
REF
4
10
REF
(X4)
18
2
CUT HOSE TO 15 CM Length
KEYPLUG CONNECTOR TO NIBP MODULE
REF
4
REF
3
13
12
1.5±1
1.5±1
REAR VIEW
REF
4
REF
15
DETAIL A
SCALE 2:1
9
REF

1 PRESS ITEM 25 FROM THE OUTER SIDE OF BOARD P&SB SO THAT IT WILL FACE THE PLASTIC COVER SIDE

ASSY. INSTRUCTIONS :

1. ATTACH ITEM NO. 15 TO ITEM NO. 14.
2. ATTACH ITEM 16 BETWEEN ITEMS 17, 15 BY USING SCREWS, ITEM 19.
3. INSERT ITEM 19 INTO ITS HOLE.
4. INSERT ITEM 16 CONNECTOR INTO J1.
5. INSERT ITEM 7 ,IN THE DIRECTION SHOWN, INTO J3, LOCATED ON ITEM 22, AND INTO J2, LOCATED ON ITEM 2.

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DESIGN	Avishai	28.5.97
DRAWIN	Dafna	25.8.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :
SEE B.O.M

DESCRIPTION :
NIBP MODULE-TOP ASSY

FINISH :

PART No : 551-130-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 1
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. F

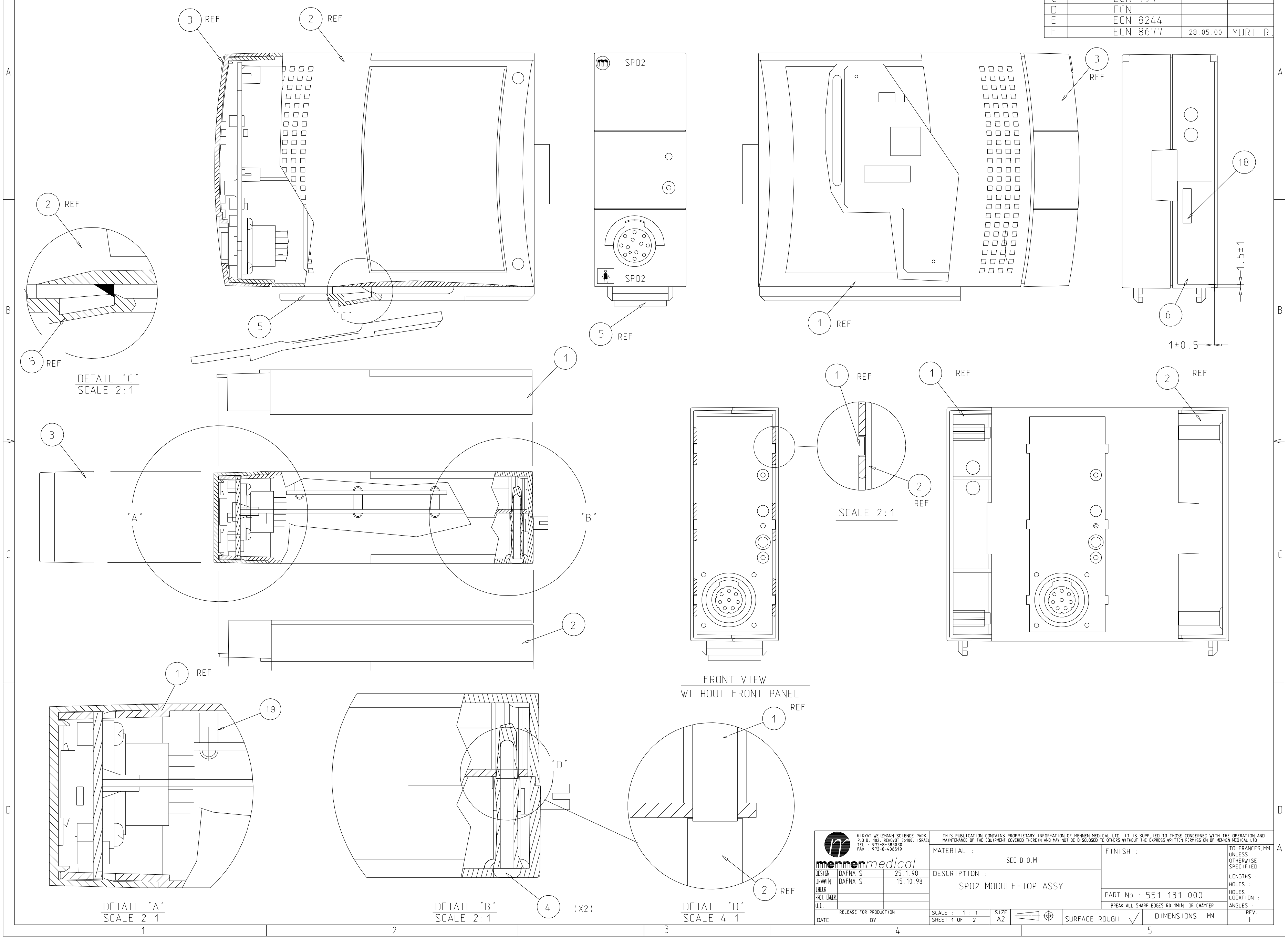
9 SPO$_2$ (Nellcor MP204P) Module – Top Assembly

Bill of Material (551-131-000) REV. E

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF:	AP 551-131-000 REV. A TP 551-131-000 REV. C SRD 551-431-000 REV. B HDS 551-131-000 REV. - ECN 7808 REV. A ECN 7855 REV. B ECN 7971 REV. C ECN 8059 REV. D ECN 8244 REV. E					
001	551-616-000		LEFT SIDE, SHORT	EA	1	S
002	551-615-000		RIGHT SIDE, SHORT	EA	1	S
003	551-601-131		FRONT PANEL – SPO2	EA	1	S
004	134-715-019		SCREW, ST K3STAR, 30X30	EA	2	S
005	551-619-000		latch	EA	1	s
006	551-701-131		label-SPO2 module	EA	1	s
007	551-609-000		partition-SPO2	EA	1	s
008	551-306-005		CABLE-SPO2 (NELLCOR)	EA	1	M
009	551-208-000		PCBA-SPO2 INTERFACE	ea	1	M
010	261-330-020		MP204P SPO2 BOARD-NELLCOR (REWORK)	ea	1	B
011	551-200-000		pcba-processing & storage block (p&sb)	ea	1	m
012	134-100-009		SCREW 2-56X1/4 PH PHIL SS	ea	6	B
013	124-015-028		STANDOFF, ROUND 3/16", 2-56"X5/8 NYLON	ea	3	b
014	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	ea	2	B
015	134-144-104		SCREW 4-14X1/4 PLT-30 PH PHIL STL	ea	6	b
016	551-431-000		SPO2 (OEM) INTERFACE SOFTWARE	ea	0.001	M
017	551-624-000		INSULATOR, (SPO2)	EA	1	S
018	551-702-103		LABEL, SOFTWARE REVISION	EA	1	S
019	124-015-048		TEARDROP CIRCUIT BOARD SUPPORT, SPACER PST 1/4	EA	1	S

REVISIONS

A	ECN 7808		
B	ECN 7855		
C	ECN 7971		
D	ECN		
E	ECN 8244		
F	ECN 8677	28.05.00	YURI R.



3 REF
2 REF
SPO2
SPO2
3 REF
18
1.5±1
1±0.5
6
5
'C'
5 REF
1 REF
2 REF
5 REF
DETAIL 'C'
SCALE 2:1
1
3
'A'
'B'
2
1 REF
2 REF
SCALE 2:1
1 REF
2 REF
FRONT VIEW
WITHOUT FRONT PANEL
1 REF
19
'D'
4 (X2)
1 REF
2 REF
DETAIL 'A'
SCALE 2:1
DETAIL 'B'
SCALE 2:1
DETAIL 'D'
SCALE 4:1

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DESIGN	DAFNA S.	25.1.98
DRAWIN	DAFNA S.	15.10.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL : SEE B.O.M

DESCRIPTION : SPO2 MODULE-TOP ASSY

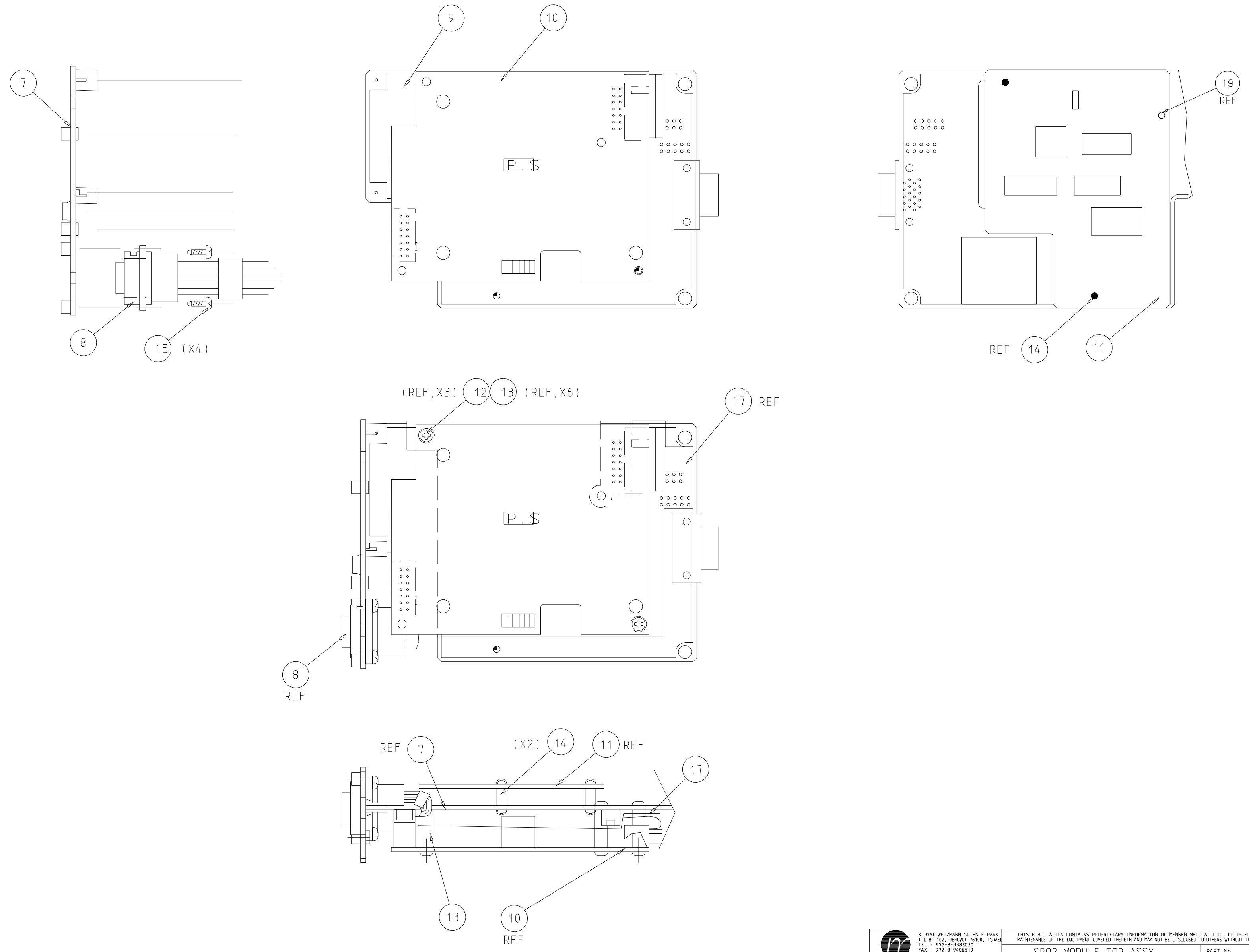
FINISH :

PART No : 551-131-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 2
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. F


7
8
15 (X4)
9
10
P.S
19 REF
REF 14
11
(REF,X3) 12
13 (REF,X6)
17 REF
P.S
8 REF
REF 7
(X2) 14
11 REF
17
13
10 REF

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SPO2 MODULE TOP ASSY

PART No 551-131-000

SIZE A2

SCALE : 1 : 1

SHEET 2 OF 2

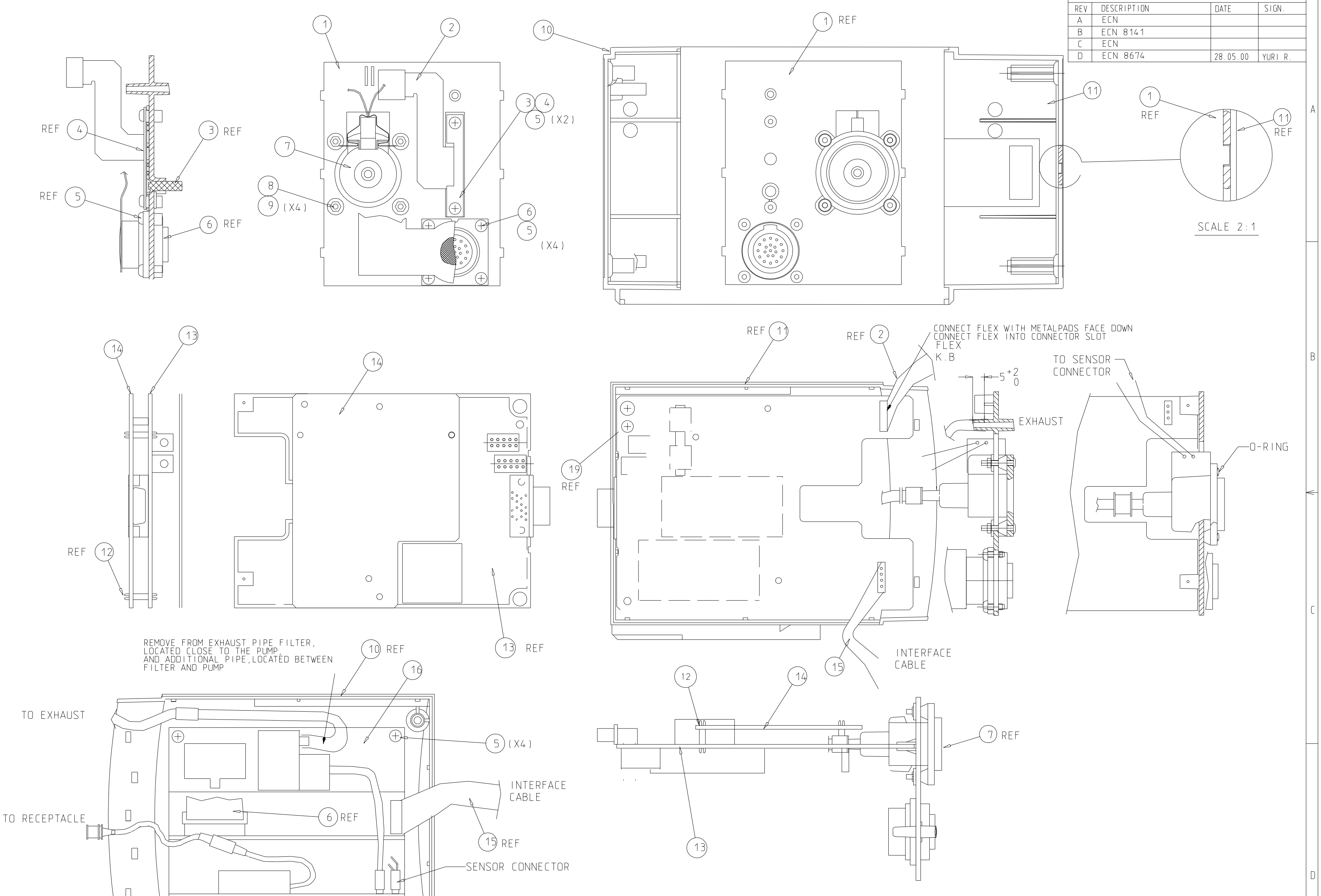
REV. F

10 Module $ETCO_2$ – Top Assembly

Bill of Material (551-133-000) REV. C

Desg	*Item no.*	*Rev*	*Description*	*Unit*	*Qty*	*SR*
REF:	AP 551-133-000 REV. A TP 551-133-000 REV. B SRD 551-433-000 REV. B ECN 8029 REV. A ECN 8141 REV. B					
001	551-613-000		PARTITION-ETCO2	EA	1	S
002	551-220-000		FLEX, KEYPAD (NIBP “CAS”)	EA	1	B
003	551-601-131		RUBBER K.B. (ONE KEY)	EA	1	S
004	551-502-000		PLATE, K.B. (ONE KEY)	EA	1	S
005	134-144-104		SCREW 4-14X1/4 PLT-30 PH PHIL STL	EA	10	B
006	551-141-000		FLEX CIRCUIT WITH NICOLAY CONNECTOR	EA	1	s
007	551-133-025		SHORT WATERTRAP RECEIVER	EA	1	B
008	134-100-025		SCREW 2-56 X1/2 PH STL PHIL	EA	4	B
009	133-100-010		NUT-HEX 2-56 THD	ea	4	B
010	551-620-100		$ETCO_2$ RIGHT SIDE PANEL REWORK (NO. 551-620-000)	ea	1	S
011	551-623-100		$ETCO_2$ LEFT SIDE PANEL REWORK (NO. 551-623-000)	ea	1	S
012	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	ea	3	B
013	551-213-000		PCBA- ETCO2 INTERFACE	ea	1	M
014	551-200-000		PCBA- PROCESSING & STORAGE BLOCK (P&SB)	ea	1	M
015	551-313-000		CABLE PRYON INTERFACE	ea	1	M
016	551-140-000		DUET NIPS ASM. COMPLETE FOR CO2	ea	1	B
020	124-090-027		STANDOFF, HEX,F/F 1-3/4” X 1/4-4-40,AL	EA	1	B
021	134-101-060		SCREW-MACH 4-40X5/8 PH PHIL SS	EA	2	B
022	124-015-048		GLUE, IDENTICOL-ORANGE OR PURPLE	EA	0.001	B
023	134-101-112		SCREW 4-40X 1/8 BH STL PHIL	EA	2	
024	551-601-133		FRONT PANEL-ETCO2 (“PRYON”)	EA	1	S
025	551-605-010		PIPE LIGHT (MIDDLE)	EA	1	S
026	551-619-000		LATCH	EA	1	S
027	551-701-133		LABEL, ETCO2 MODULE	EA	1	S
028	551-433-000		SOFTWARE FOR ETCO2 MODULE	EA	0.001	S
029	551-702-103		LABEL, SOFTWARE REVISION	EA	1	S

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
A	ECN		
B	ECN 8141		
C	ECN		
D	ECN 8674	28.05.00	YURI R.



1
2
REF 4
3 REF
REF 5
6 REF
7
8
9 (X4)
3 4
5 (X2)
6
5
(X4)
10
1 REF
11
1
REF
11
REF
SCALE 2:1
14
13
14
REF 12
19
REF
13 REF
REF 11
REF 2
CONNECT FLEX WITH METALPADS FACE DOWN
CONNECT FLEX INTO CONNECTOR SLOT
FLEX
K.B
-5^{+2}_{0}
EXHAUST
TO SENSOR
CONNECTOR
O-RING
INTERFACE
CABLE
15
REMOVE FROM EXHAUST PIPE FILTER,
LOCATED CLOSE TO THE PUMP,
AND ADDITIONAL PIPE, LOCATED BETWEEN
FILTER AND PUMP
10 REF
16
TO EXHAUST
5 (X4)
INTERFACE
CABLE
TO RECEPTACLE
6 REF
15 REF
SENSOR CONNECTOR
12
14
7 REF
13

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DESIGN	AVISHAY S.	29.1.98
DRAWIN	DAFNA	25.8.98
CHECK		
PROJ. ENGER.		
Q.C.		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

FINISH :

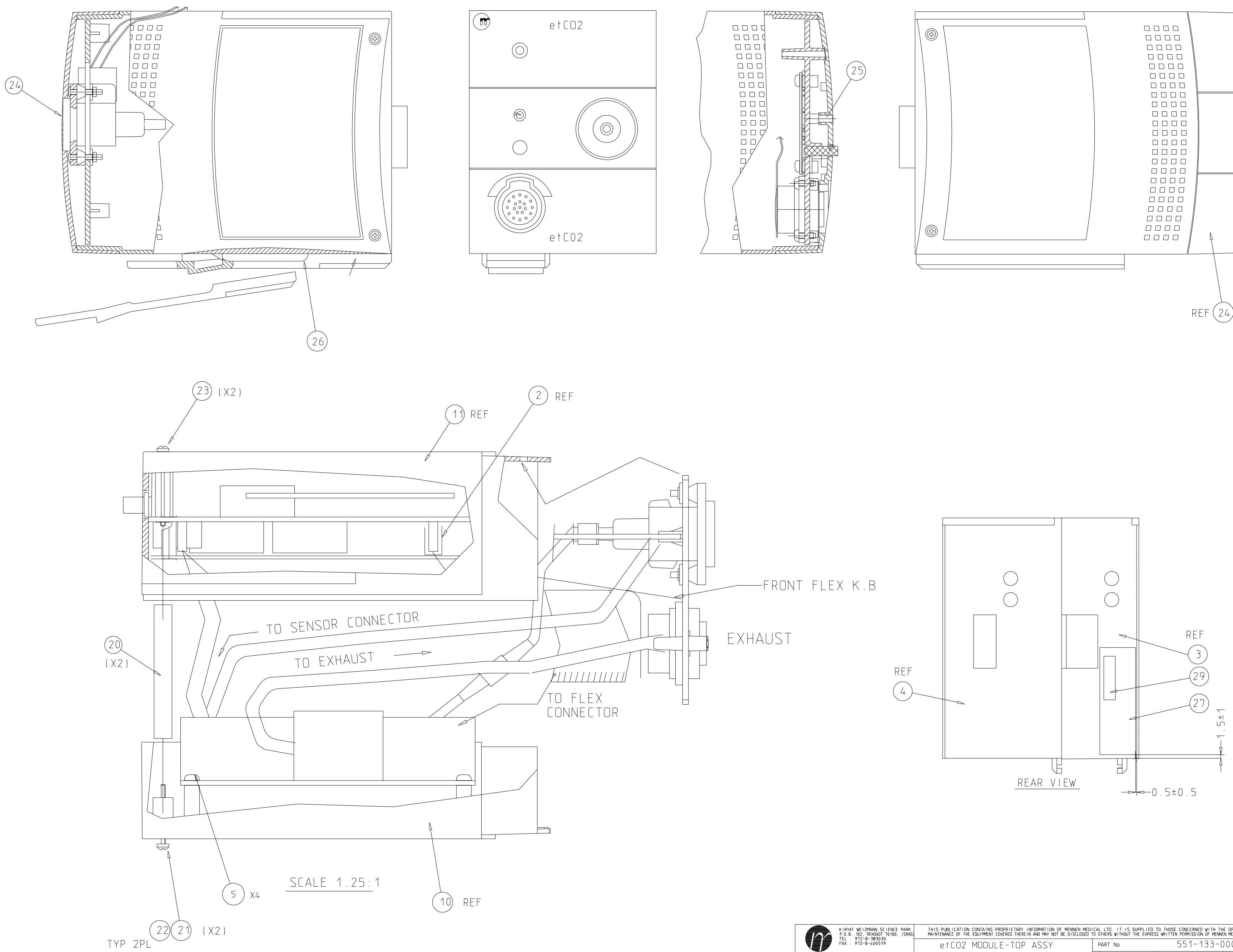
DESCRIPTION :
etCO2 MODULE - TOP ASSY

PART No : 551-133-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS :
HOLES :
HOLES LOCATION :
ANGLES :

SCALE : 1 : 1
SHEET 1 OF 2
SIZE A2
SURFACE ROUGH. √
DIMENSIONS : MM
REV. D



etCO2
etCO2
24
26
25
REF 24
23 (X2)
11 REF
2 REF
20 (X2)
TO SENSOR CONNECTOR
TO EXHAUST
FRONT FLEX K.B
EXHAUST
TO FLEX CONNECTOR
5 X4
10 REF
SCALE 1.25:1
22 21 (X2)
TYP 2PL
REF 3
29
27
REF 4
REAR VIEW
1.5±1
0.5±0.5

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etCO2 MODULE-TOP ASSY

PART No 551-133-000

SIZE A2

SCALE 1 : 1(1.25:1)

SHEET 2 OF 2

REV. D

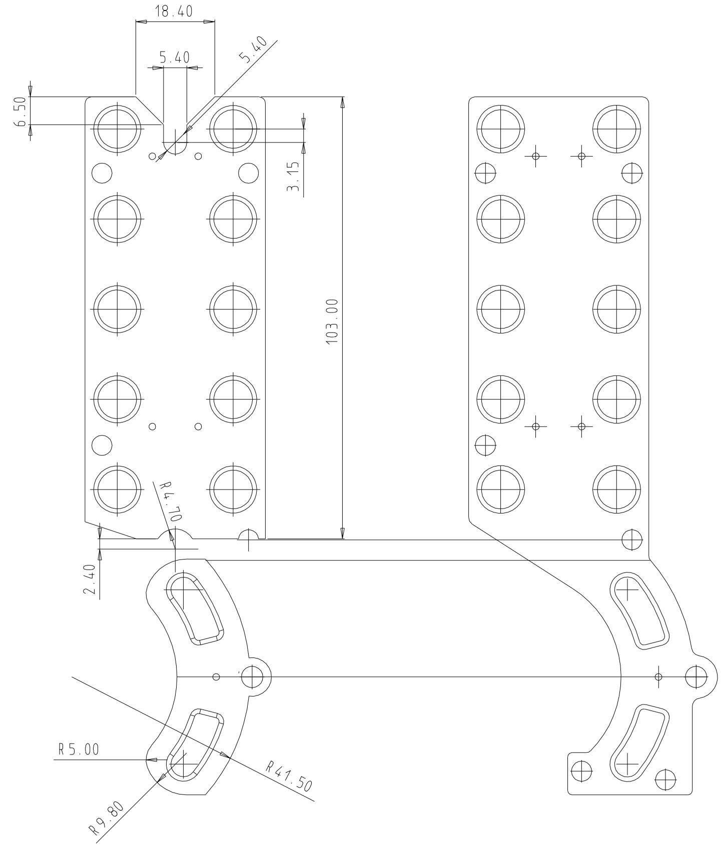
11 Remote Control MCU Assembly

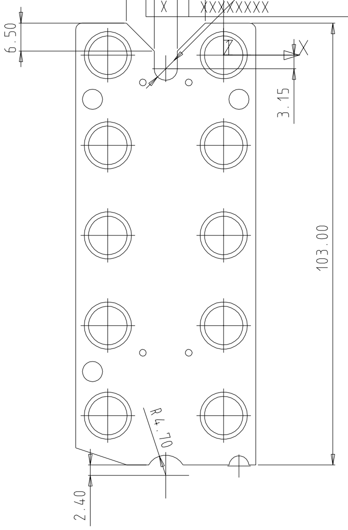
Bill of Material (551-160-000) REV. A

Desg	Item no.	Rev	Description	Unit	Qty	SR
REF:	TP 551-160-000 REV. - ECN 8376 REV. A					
001	551-606-161		remote control-mcu knob trm rework	EA	1	S
002	551-602-160		cover-mcu remote control	EA	1	s
003	554-602-000		rubber keypad b. s. computer	EA	1	S
004	551-261-000		flex keypad mcu remote	EA	1	S
005	551-260-000		pcba-mcu remote control	EA	1	m
006	127-115-500		sw optical encoder, 24 pos. w-nut	EA	1	b
007	551-601-160		base-mcu remote control	EA	1	s
008	134-715-030		screw k20 x12mm	EA	2	B
009	551-701-160		label remote controle mcu	ea	1	s
010	551-303-160		mcu remot-external cable assy	ea	1	m

REVISIONS

REV	DESCRIPTION	DATE	SIGN.
X	XXXXXXXX	XX.XX.XX	





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TEL : 972-8-383030
FAX : 972-8-406519

DESIGN	XXXXXXXX	XX.XX.XX
DRAWIN	XXXXXXXX	XX.XX.XX
CHECK	XXXXXXXX	XX.XX.XX
PROJ. ENGER.	XXXXXXXX	XX.XX.XX
Q.C	XXXXXXXX	XX.XX.XX

RELEASE FOR PRODUCTION
DATE XX.XX.XX BY XXXXXXXX

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MATERIAL : XXXXXX

DESCRIPTION :
XXXXXXXXXXX
XXXXXXXXXXXX

FINISH :
XXXXXXXX
XXXXXXXX
XXXXXXXX
XXXXXXXX

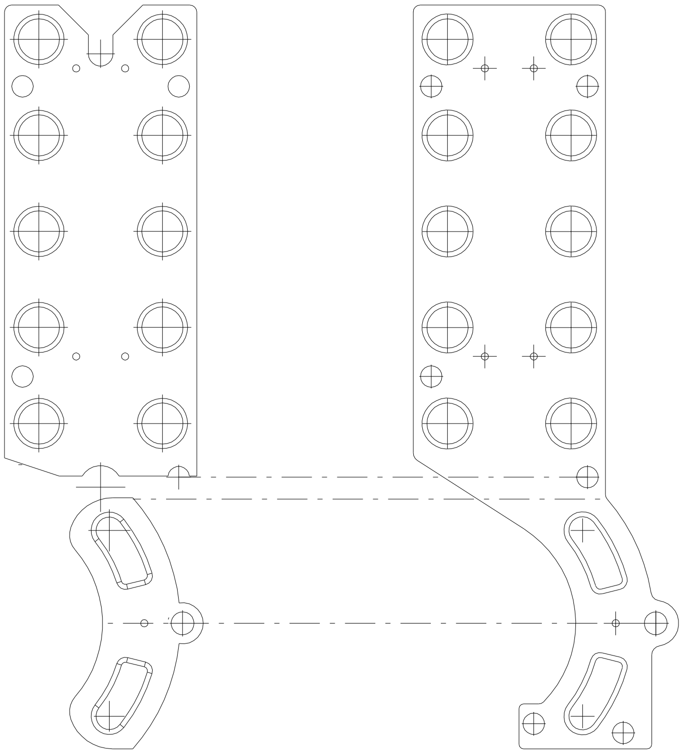
PART No : XXXXXXXXXX

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM
UNLESS
OTHERWISE
SPECIFIED
LENGTHS: ±X.XX
HOLES: ±X.XX
HOLES LOCATION: ±X.XX
ANGLES: ±X.XX

SCALE : X:X
SHEET X OF X
SIZE A3
SURFACE ROUGH. X√
DIMENSIONS : DIM
REV. X

C:\UDD\XXXXXXXX\XXXXXXXX\XXXXXXXX



NOTES:

1. USE PART: ITEM-551-609-160: 2 PLATES FOR RUBBER REWORK
   USE KNIFE
   CUT PART NO. 554-602-000 AS SHOWN

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FAX : 972-8-9406519

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DESCRIPTION: REMOTE CONTROL- MCU ASSY

PART No 551-160-000

SIZE A3

SCALE : 1:1

SHEET 2 OF 2

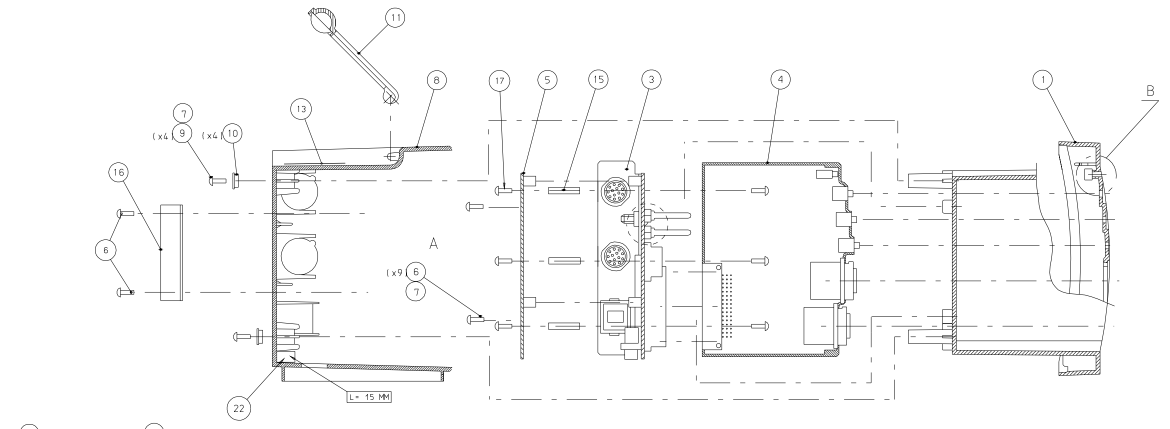
REV. A

12 Module Rack #6M – Top Assembly

Bill of Material (553-000-000) REV. D

Desg	***Item no.***	***Rev***	***Description***	***Unit***	***Qty***	***SR***
REF: AP 553-000-000 REV. A TP 553-000-000 REV. B SRD 553-403-000 REV. B HDS 553-000-000 REV. - ECN 7788 REV. A ECN 7974 REV. B ECN 8259 REV. C ECN 8478 REV. D						
001	553-601-000		FRONT PANEL, M.R. #6m	EA	1	S
002	551-605-010		PIPE LIGHT (MIDDLE)	EA	1	s
003	553-201-000		PCBA-MOTHER BOARD M.R #6M	EA	1	M
004	553-202-000		PCBA-OUTPUT BOARD, M.R	EA	1	M
005	553-203-000		PCBA-CONTROLLER, M.R	EA	1	m
006	134-102-008		SCREW 6-32 X ¼ PH PHIL SS	EA	9	B
007	112-113-243		ADHESIVE 242-05 LOCKTITE	EA	0.001	B
008	553-602-000		REAR CASE, MODULE RACK #6M	EA	1	s
009	553-507-000		screw, captive 6-32	ea	4	s
010	133-103-012		retainer, flush mounted, 6-32	ea	4	b
011	553-603-000		handle	ea	1	s
013	553-701-000		label-m.r #6m	ea	1	s
014	553-403-000		module rack 6m software	ea	1	m`
015	124-015-028		standoff, round 3/16", 2-56"x5/8 nylon	ea	6	b
016	553-502-000		plate-mounting (IVPOLE)	ea	1	s
017	134-001-020		screw 2-56x1/4 rh ny	ea	12	
022	199-184-152		electroseal conductive gasket	ft	0.85	b

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
A	ECN 7788		
B	ECN 7974		
C	ECN		
D	ECN		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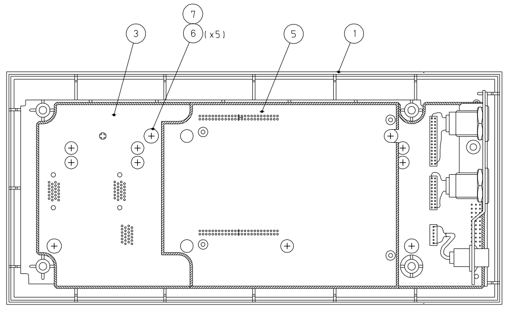
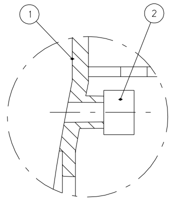
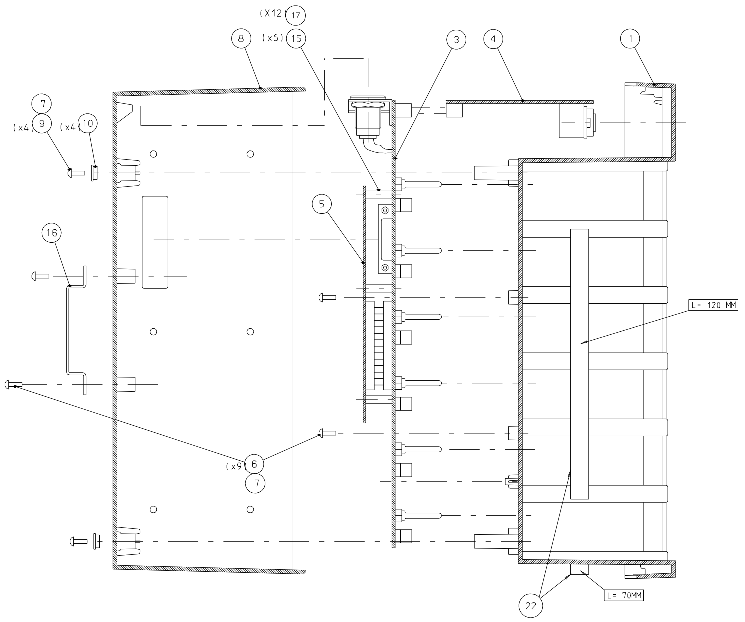
8
13
(x4) 7 9
(x4) 10
16
6
A
(x9) 6 7
22
L= 15 MM
17
5
15
3
4
1
B

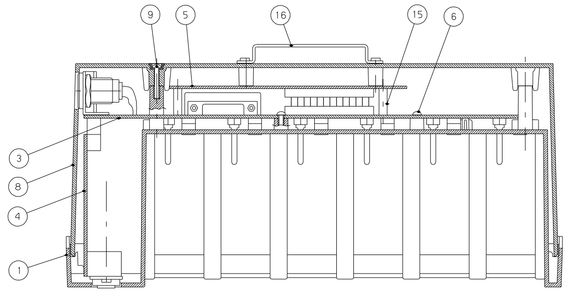


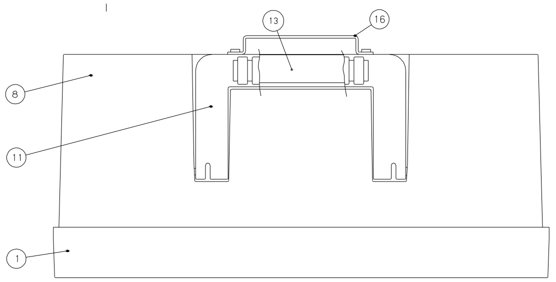
VIEW A



DET B
3:1


(X12) 17
(x6) 15
8
3
4
1
7
(x4) 9
(x4) 10
5
16
L= 120 MM
(x9) 6 7
22
L= 70MM


9
5
16
15
6
3
8
4
1



TOP VIEW

KIRYAT WEIZMANN SCIENCE PARK
P.O.B. 102, REHOVOT 76100, ISRAEL
TEL : 972-8-383030
FAX : 972-8-406519

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DESIGN	DAFNA S	4.2.98
DRAWIN	DAFNA S	30.7.98
CHECK		
PROJ. ENGER.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

FINISH :

DESCRIPTION :
MODULE RACK #6M
TOP ASSEMBLY

PART No : 553-000-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS: ±3.00
HOLES:
HOLES LOCATION:
ANGLES:

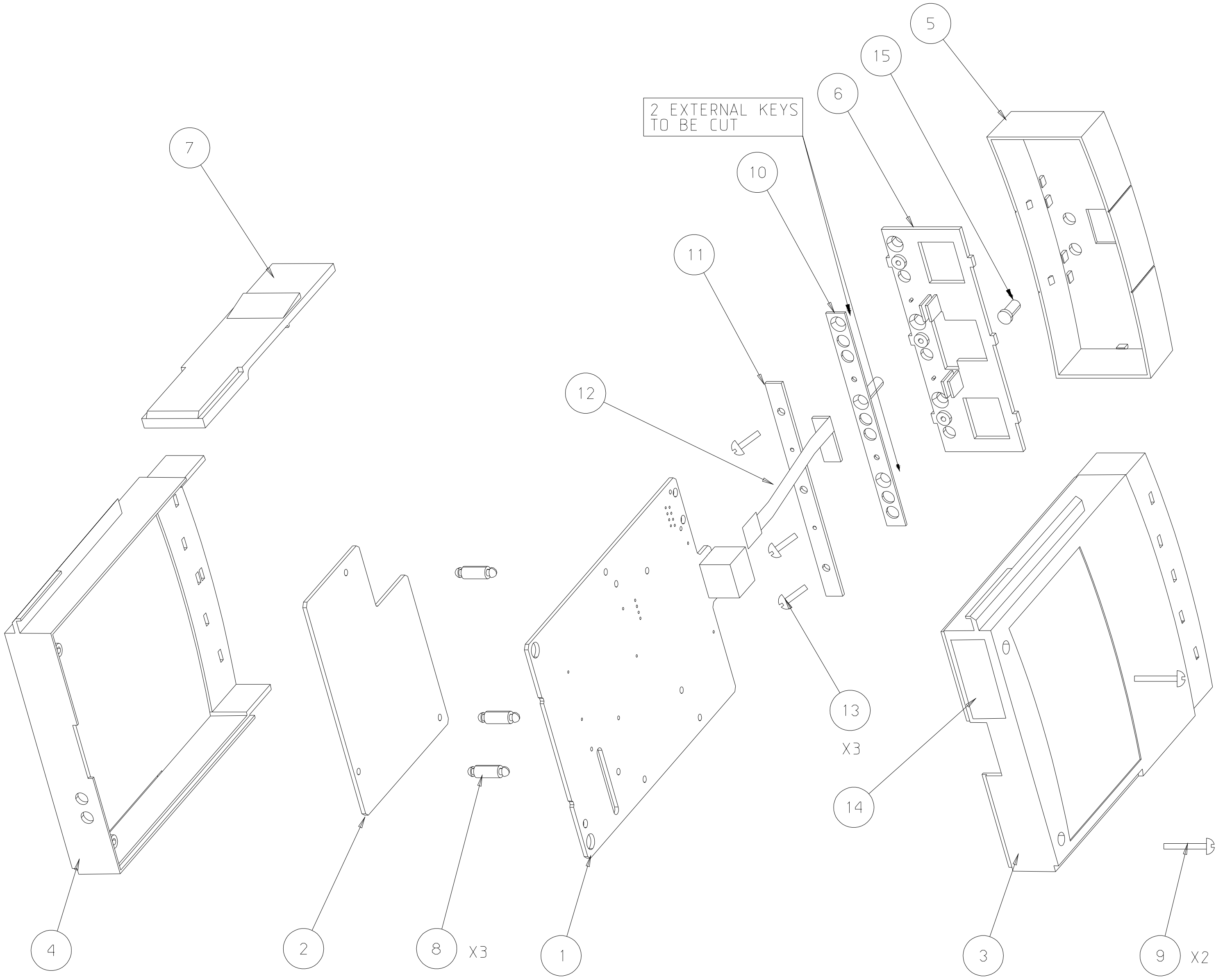
SCALE :
SHEET 1 OF 1
SIZE A1
SURFACE ROUGH. √
DIMENSIONS : MM
REV. D

13 Module eTCO $_2$ Single Top Assembly

Bill of Material (551-135-000)

Desg	*Item no.*	*Rev*	*Description*	*Unit*	*Qty*	*AR*	*SR*
ECN 8678		A					
001	551-235-000	B	PCBA-ETCO$_2$ SINGLE MODULE INTERFACE	EA	1		P
002	551-200-000	C	PCBA- PROCESSING & STORAGE BLOCK (P&SB)	EA	1		P
003	551-615-000	A	RIGHT SIDE, SHORT	EA	1		B
004	551-616-000	B	LEFT SIDE, SHORT	EA	1		B
005	551-601-135	A	FRONT PANEL-ETCO$_2$ SINGLE MODULE	EA	1		B
006	551-635-000	A	PARTITION UNIPORT/ETCO$_2$ SINGLE REWORK	EA	1		B
007	551-619-000	B	LATCH	EA	1		B
008	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	EA	3		B
009	134-715-019		SCREW,ST K3STAR, 30X30	EA	2		B
010	551-606-000	A	RUBBER KEY PAD, 3 KEYS	EA	1		B
011	551-503-000	A	PLATE-K.B (3 KEYS)	EA	1		B
012	551-254-000	-	FLEX KEYPAD ETCO$_2$ SINGLE MODULE	EA	1		P
013	134-144-104		SCREW 4-14X1/4 PLT-30 PH PHIL STL	EA	3		B
014	551-701-135	-	LABEL-ETCO$_2$ SINGLE MODULE	EA	1		B
015	551-605-010	A	LIGHT PIP, (MIDDLE)	EA	1		B
016	551-445-100	V1.8	SOFTWARE-NIHON KOHDEN TG901 ETCO$_2$	EA	1		R

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
A	ECN 8678	28.05.00	YURI R.



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DESIGN	DAFNA	20.7.99
DRAWIN	DAFNA	20.7.99
CHECK		
PROJ. ENGER.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

DESCRIPTION :
MODUEL ETCO2 SINGLE-TOP ASSY

FINISH :

PART No : 551-135-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

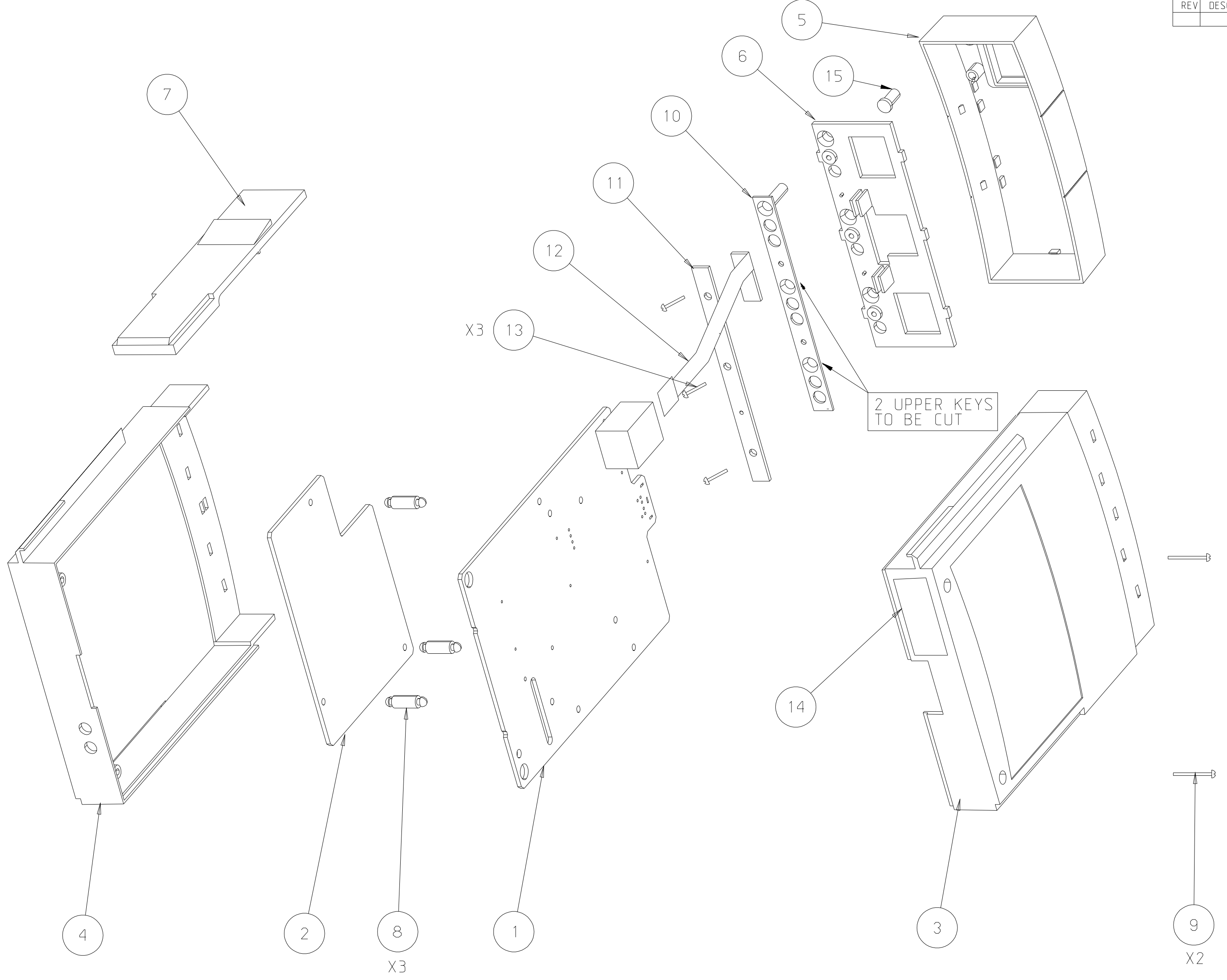
SCALE : 1:1
SHEET 1 OF 1
SIZE A2
SURFACE ROUGH. √
DIMENSIONS MM
REV. A

14 Module Uniport Top Assembly

Bill of Material (551-145-000)

Desg	*Item no.*	*Rev*	*Description*	*Unit*	*Qty*	*AR*	*SR*
		-					
001	551-245-000	A	PCBA-ETCO2 SINGLE MODULE INTERFACE	EA	1		P
002	551-200-000	C	PCBA- PROCESSING & STORAGE BLOCK (P&SB)	EA	1		P
003	551-615-000	A	RIGHT SIDE, SHORT	EA	1		B
004	551-616-000	B	LEFT SIDE, SHORT	EA	1		B
005	551-602-145	A	UNIPORT-ARTWORK (UN 1 CHANNEL)	EA	1		B
006	551-635-000	A	PARTITION UNIPORT/ETCO2 SINGLE REWORK	EA	1		B
007	551-619-000	B	LATCH	EA	1		B
008	124-015-045		SPACER PCB SNAP IN BOTH SIDE 1/4L NY	EA	3		B
009	134-715-019		SCREW,ST K3STAR, 30X30	EA	2		B
010	551-606-000	A	RUBBER KEY PAD, 3 KEYS	EA	1		B
011	551-503-000	A	PLATE-K.B (3 KEYS)	EA	1		B
012	551-253-000	-	FLEX KEYPAD UNIPORT	EA	1		P
013	134-144-104		SCREW 4-14X1/4 PLT-30 PH PHIL STL	EA	3		B
014	551-701-145	-	LABEL-UNIPORT MODULE	EA	1		B
015	551-605-020	-	LIGHT PIP, (BOTTOM)	EA	1		B

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.



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DESIGN	DAFNA	20.7.99
DRAWIN	DAFNA	20.7.99
CHECK		
PROJ. ENGER.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL :

FINISH :

DESCRIPTION :

MODULE UNIPORT-TOP ASSY
(UIM 1 CHANNEL)

PART No : 551-145-000

BREAK ALL SHARP EDGES R0.1MIN. OR CHAMFER

TOLERANCES,MM UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

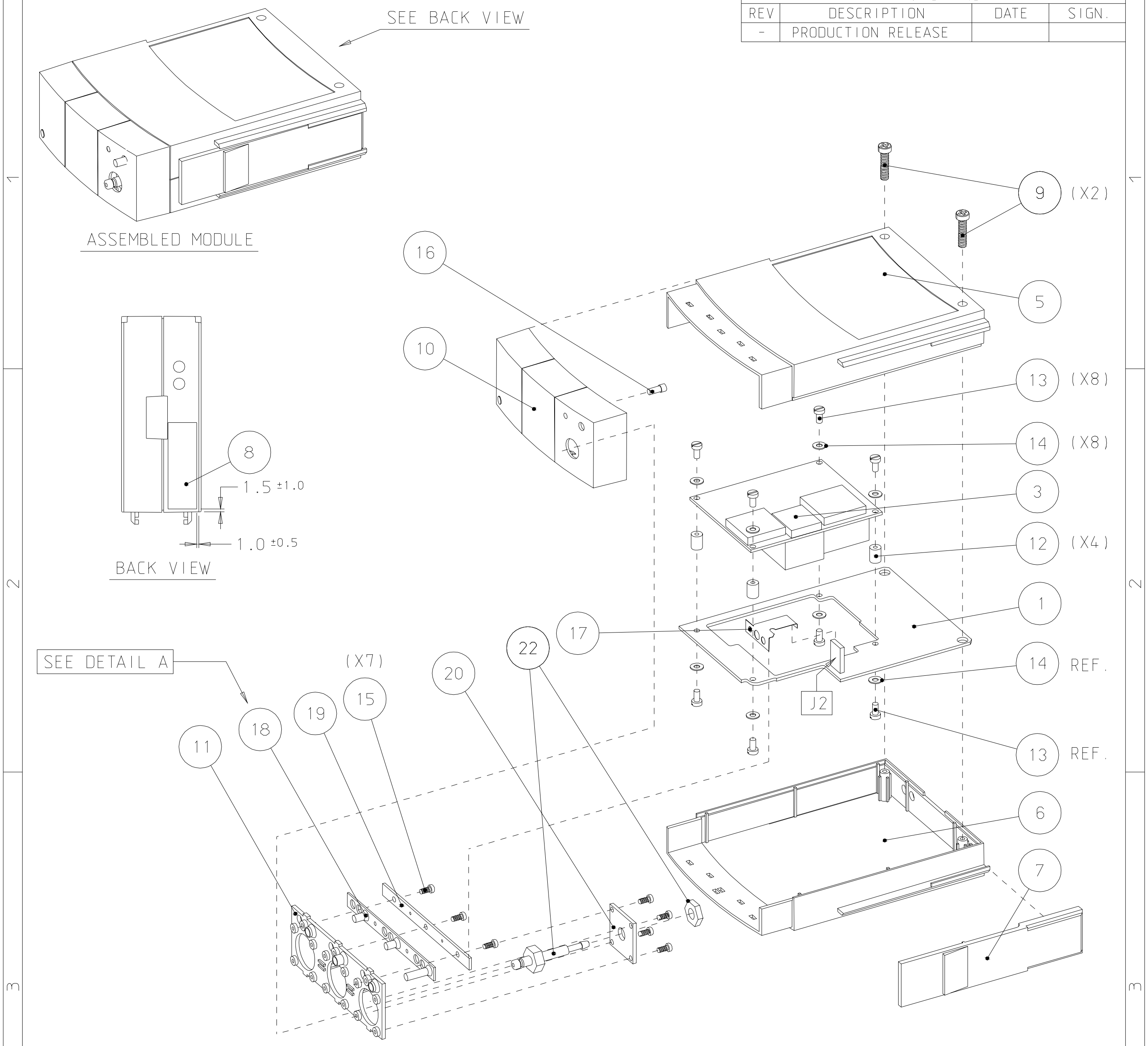
SCALE : 1:1
SHEET 1 OF 1
SIZE A2

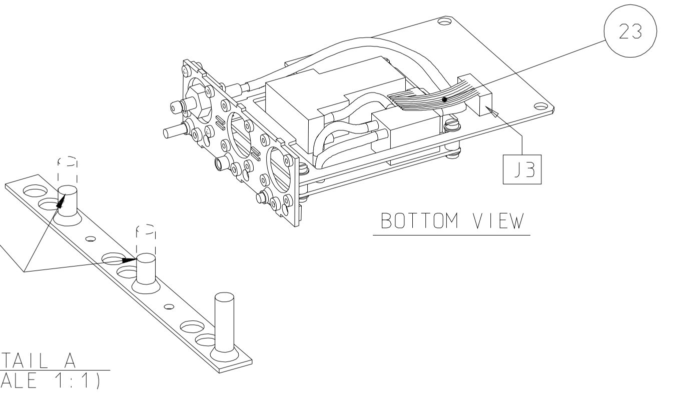
SURFACE ROUGH. √

DIMENSIONS MM

REV.
–

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
-	PRODUCTION RELEASE		

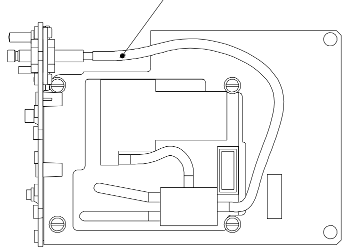

SEE BACK VIEW
ASSEMBLED MODULE
BACK VIEW
8
1.5 ±1.0
1.0 ±0.5
SEE DETAIL A
9
(X2)
5
16
10
13
(X8)
14
(X8)
3
12
(X4)
1
17
J2
22
20
(X7)
15
19
18
11
14
REF.
13
REF.
6
7


23
J3
BOTTOM VIEW

CUT RUBBER KEY-PAD
AS SHOWN,
AFTER ASSEMBLY

DETAIL A
(SCALE 1:1)

CUT PIPE TO LENGTH=140.0mm
AND ASSEMBLE AS SHOWN.



PIPE ASSEMBLY VIEW

4 HAYARDEN st. YAVNE.
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FAX: 972-8-9328510

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DESIGN	YOAV FURST	27.12.04
DRAWIN	YOAV FURST	27.12.04
CHECK	ELI AVARGIL	27.12.04
PROJ. ENG.	ELI AVARGIL	27.12.04
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL: /

DESCRIPTION:
Module NIBP (Single Slot)
TOP ASSEMBLY

FINISH: /

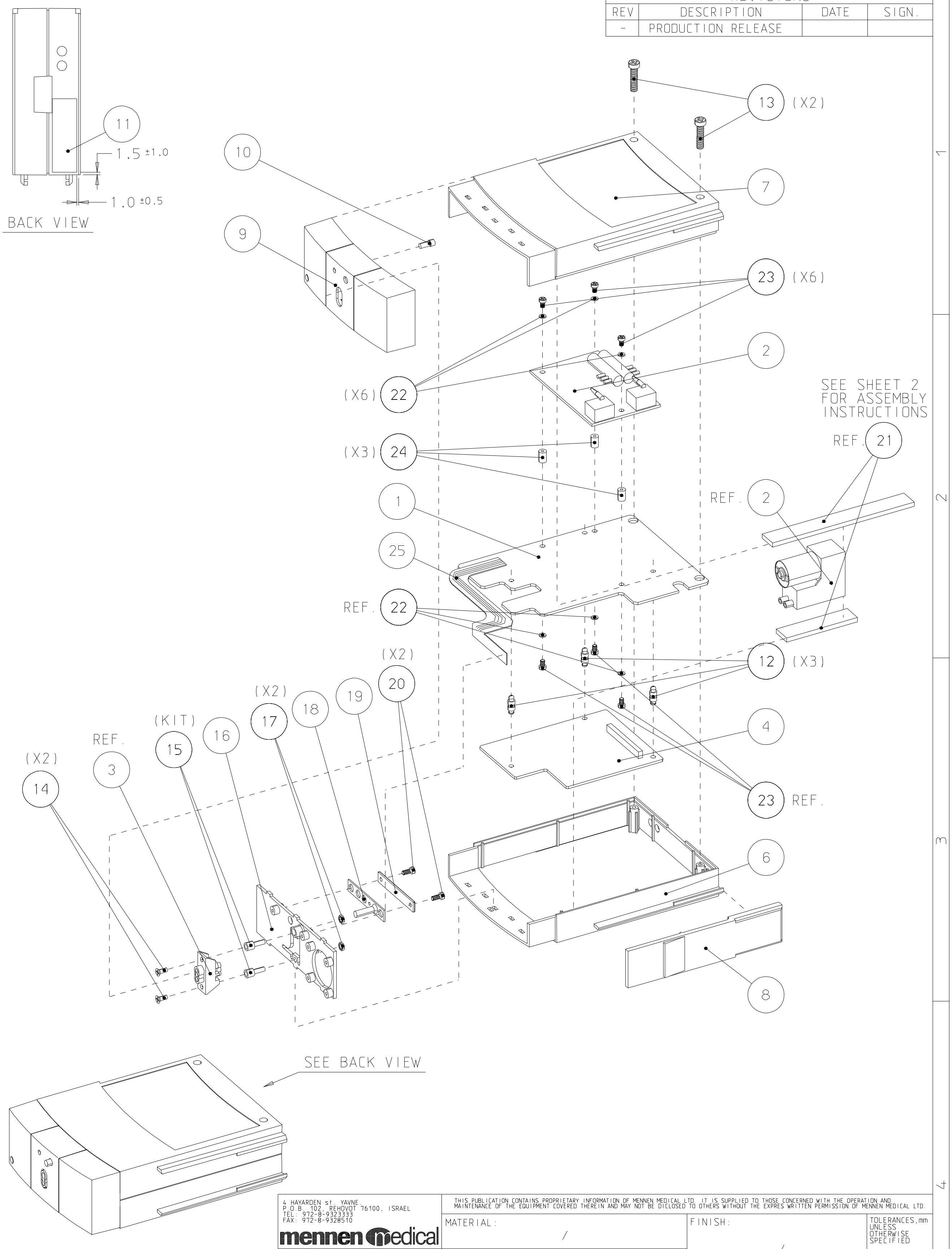
PART No: 551-132-000

BREAK ALL SHARP EDGES R0.1 Min. OR CHAMFER

TOLERANCES,mm UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

SCALE: 1:2
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH. √
DIMENSIONS: mm
REV. -

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
-	PRODUCTION RELEASE		


11
1.5 ±1.0
1.0 ±0.5
13 (X2)
10
7
9
23 (X6)
2
(X6) 22
SEE SHEET 2 FOR ASSEMBLY INSTRUCTIONS
(X3) 24
REF. 21
REF. 2
1
25
REF. 22
12 (X3)
(X2) 20
19
18
(X2) 17
16
(KIT) 15
REF. 3
(X2) 14
4
23 REF.
6
8
SEE BACK VIEW

BACK VIEW

ASSEMBLED MODULE

4 HAYARDEN st. YAVNE.
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FAX: 972-8-9328510

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DESIGN	YOAV FURST	29.07.03
DRAWIN	YOAV FURST	29.07.03
CHECK		
PROJ. ENG.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL: /

DESCRIPTION:
MODULE SPIROMETRY

FINISH: /

PART No: 551-137-000

BREAK ALL SHARP EDGES R0.1 Min. OR CHAMFER

TOLERANCES,mm UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

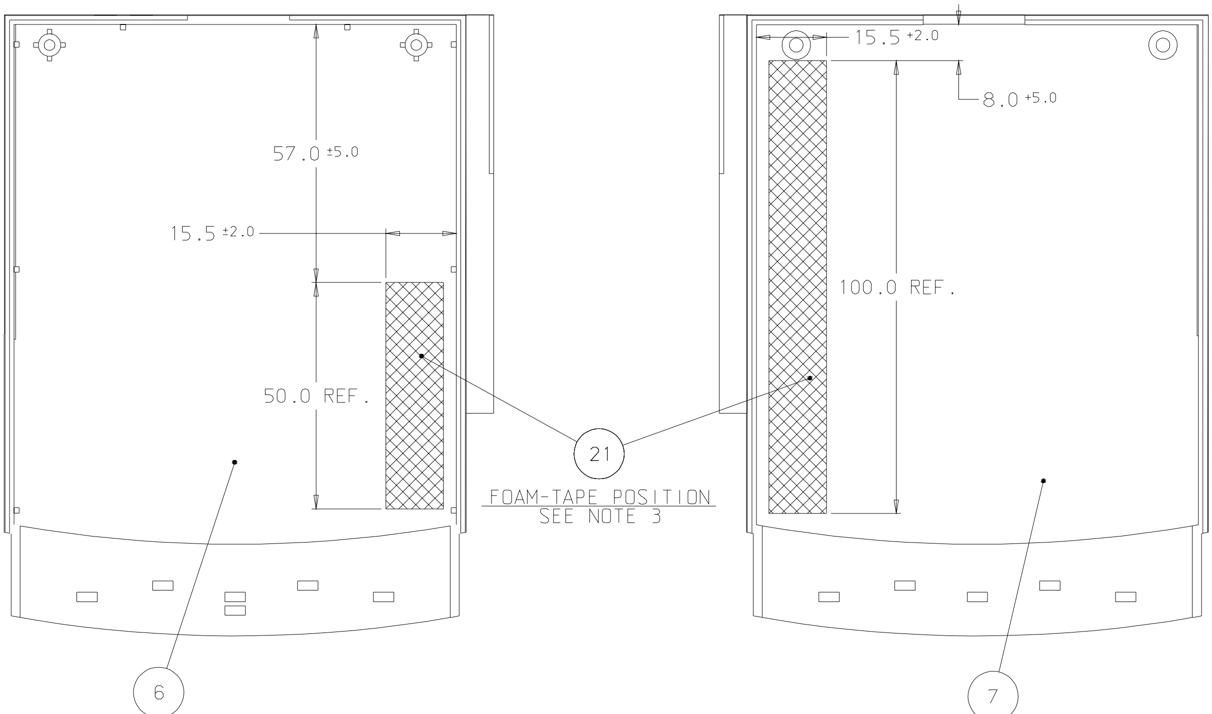
SCALE: 1:2
SHEET 1 OF 2

SIZE A3

SURFACE ROUGH. √

DIMENSIONS: mm

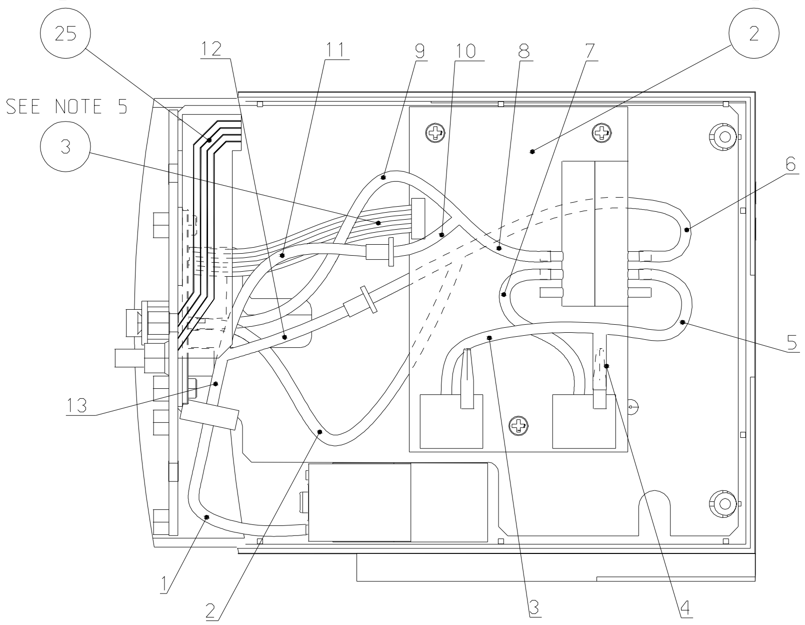
REV. -



FOAM-TAPE POSITION
SEE NOTE 3

LENGTHS OF PIPES:(+-3.0mm).

PIPE No. 1 = 40.0mm.
PIPE No. 2 = 85.0mm.
PIPE No. 3 = 40.0mm.
PIPE No. 4 = 15.0mm.
PIPE No. 5 = 35.0mm.
PIPE No. 6 = 85.0mm.
PIPE No. 7 = 40.0mm.
PIPE No. 8 = 15.0mm.
PIPE No. 9 = 90.0mm.
PIPE No. 10 = 15.0mm.
PIPE No. 11 = 35.0mm.
PIPE No. 12 = 15.0mm.
PIPE No. 13 = 20.0mm.



TOP VIEW

NOTES:

1. ASSEMBLE ITEMS 14, 2(REF.), 15, 17, 18, 19 & 20
   INCLUDING LIGHT-CONNECTOR FLEX (ITEM No. 3) TO PARTITION (ITEM No. 16)

2. ASSEMBLE P&SB (ITEM No. 4) TO MAIN P.C.B (ITEM No. 1)
   BY USING SPACERS (ITEMS No. 12) (X3).

3. ASSEMBLE FOAM TAPE (ITEMS No. 21) (X2)
   TO BOX PARTS (ITEMS No. 6 & 7) ACCORDING TO VIEWS IN SHEET 2.
   LENGTH OF TAPES (ITEMS No. 21) ARE 50.0 & 100.0mm.

4. ASSEMBLE RESPIRATORY-OEM MODULE (ITEM No. 2) TO MAIN P.C.B (ITEM No. 1) BY USING:
   SPACERS (ITEMS No. 24) (X3), SCREWS (ITEMS No. 23) (X6) AND WASHERS (ITEMS No. 22) (X6).

5. CONNECT THE LIGHT-CONNECTOR FLEX (ITEM No. 3) TO OEM BOARD (ITEM No. 2) WITH PADS FACING UP.
   MAKE SURE TO PUT THE EXTRA FLEX UNDER THE INTERFACE BOARD (ITEM No. 1).

6. ASSEMBLE THE PIPES ACCORDING TO TOP VIEW ON SHEET 2.
   MAKE SURE THAT THE PIPES ARE NOT OVER-BENT AT ALL PLACES.

7. CLOSE THE MODULE BY USING THE FRONT PANEL (ITEM No. 9) AND 2 SCREWS (ITEMS No. 13).

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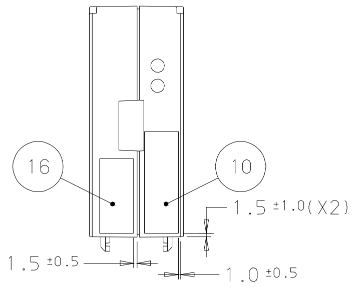
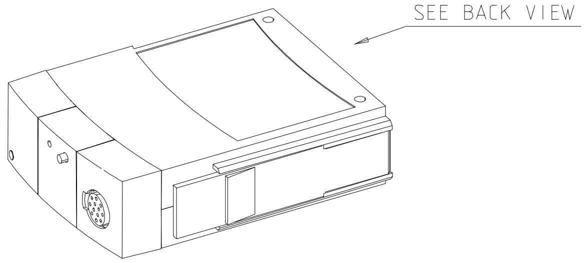
DESCRIPTION: MODULE SPIROMETRY
PART No: 551-137-000
SIZE A3
SCALE: 1:1
SHEET 2 OF 2
REV. -

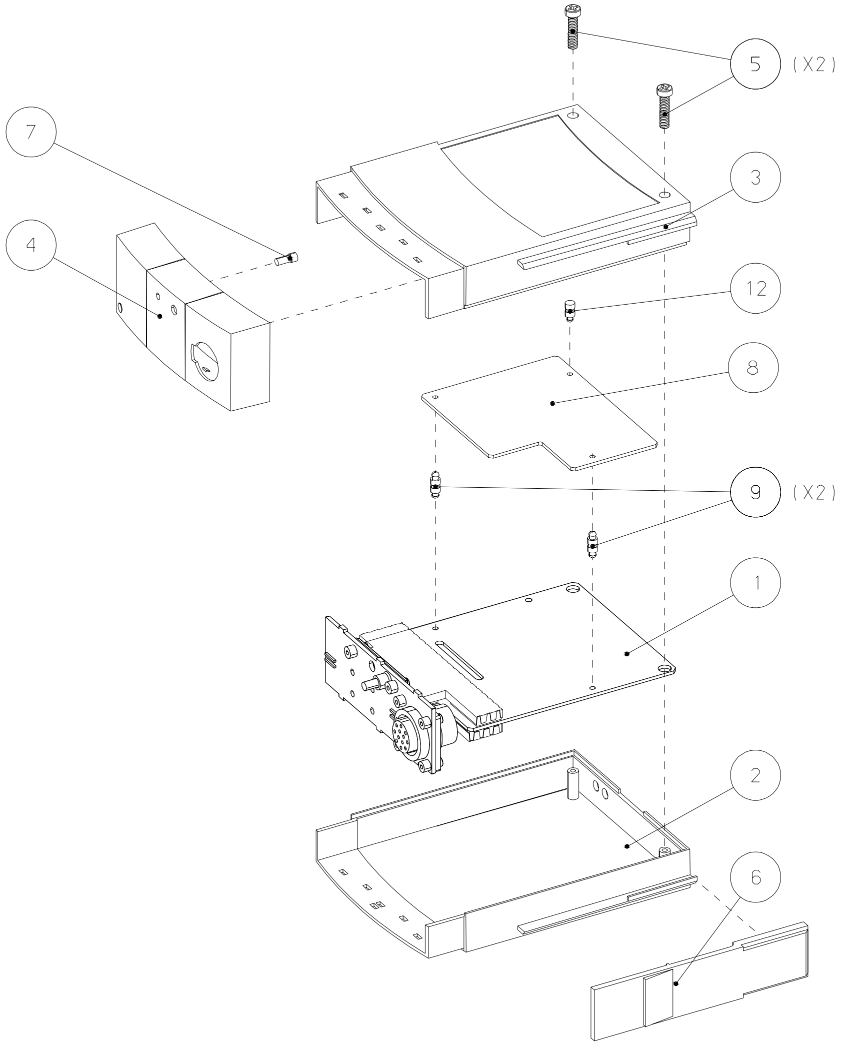
REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
-	PRODUCTION RELEASE	05.05.03	-



BACK VIEW



ASSEMBLED MODULE



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DESIGN	YOAV FURST	05.05.03
DRAWIN	YOAV FURST	05.05.03
CHECK		
PROJ. ENG.		
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL: /

DESCRIPTION:

EEG - TOP ASSEMBLY

FINISH: /

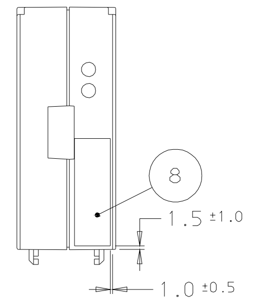
PART No: 551-138-000

BREAK ALL SHARP EDGES R0.1 Min. OR CHAMFER

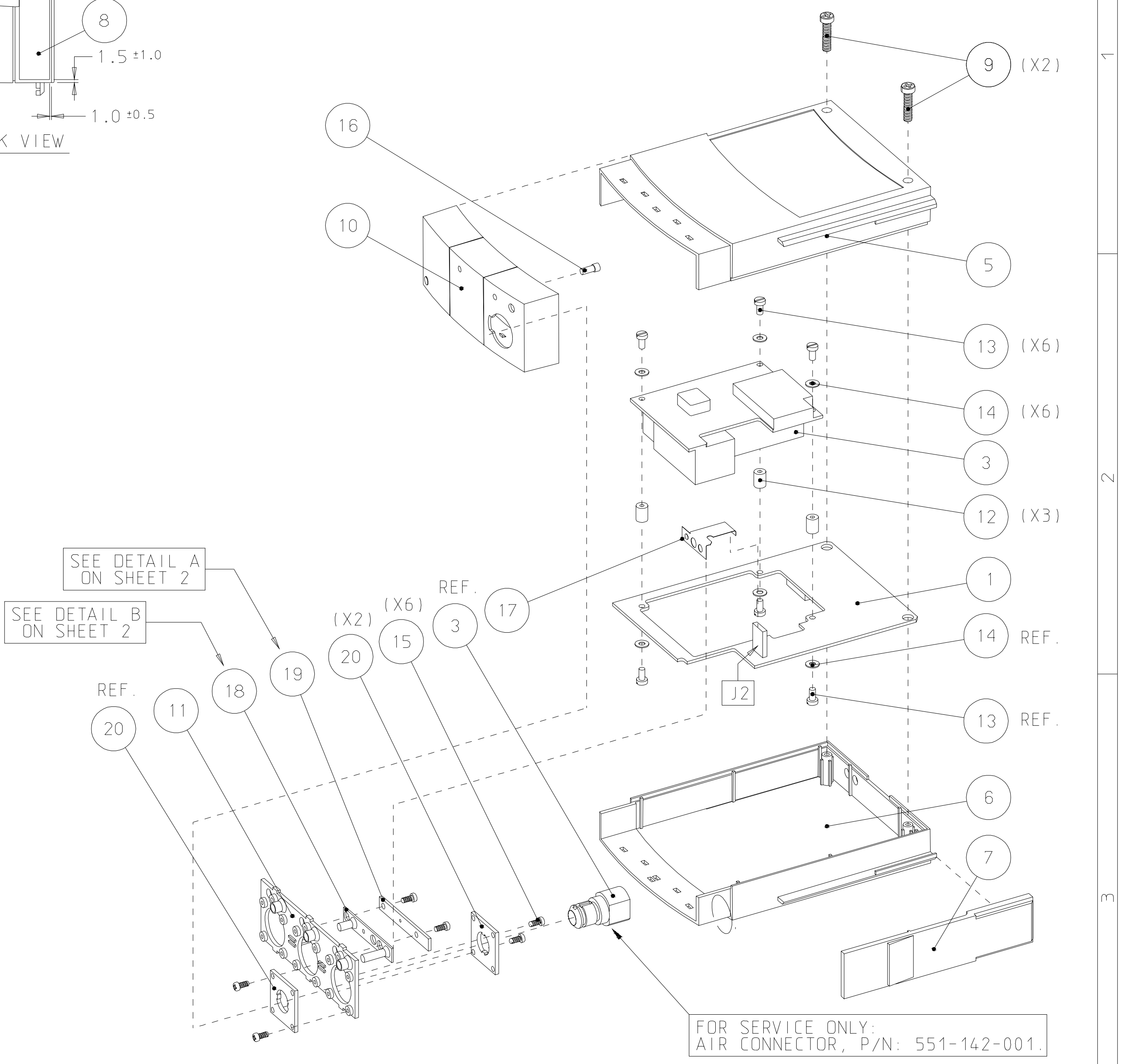
TOLERANCES,mm UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

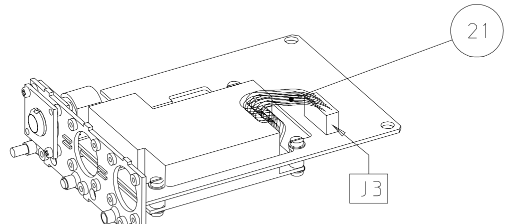
SCALE: NTS
SHEET 1 OF 1
SIZE A3
SURFACE ROUGH. √
DIMENSIONS: mm
REV. -

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.

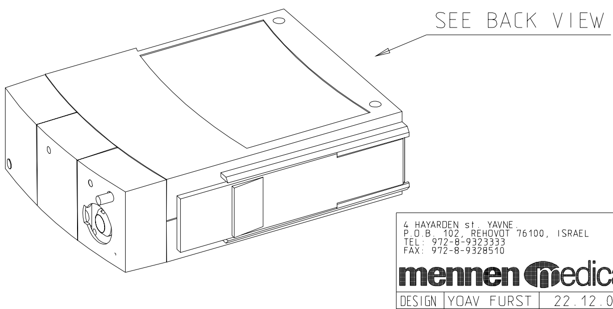


BACK VIEW


9 (X2)
16
10
5
13 (X6)
14 (X6)
3
12 (X3)
SEE DETAIL A ON SHEET 2
SEE DETAIL B ON SHEET 2
(X2)
(X6)
REF.
3
17
1
J2
14 REF.
13 REF.
REF.
20
11
18
19
20
15
6
7
FOR SERVICE ONLY:
AIR CONNECTOR, P/N: 551-142-001.



BOTTOM VIEW


SEE BACK VIEW

ASSEMBLED MODULE

4 HAYARDEN st. YAVNE.
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FAX: 972-8-9328510

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DESIGN	YOAV FURST	22.12.04
DRAWIN	YOAV FURST	22.12.04
CHECK	ELI AVARGIL	22.12.04
PROJ. ENG.	ELI AVARGIL	22.12.04
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL: /

DESCRIPTION:
Module EtCO2 (Oridion)
TOP ASSEMBLY

FINISH: /

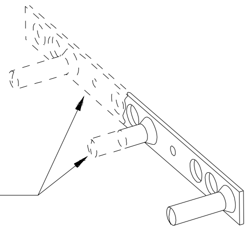
PART No: 551-142-000

BREAK ALL SHARP EDGES R0.1 Min. OR CHAMFER

TOLERANCES,mm UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

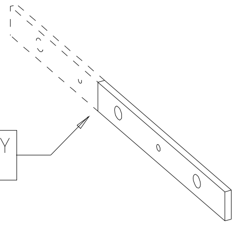
SCALE: 1:2
SHEET 1 OF 2
SIZE A3
SURFACE ROUGH. √
DIMENSIONS: mm
REV. -

REVISIONS			
REV	DESCRIPTION	DATE	SIGN.
-	PRODUCTION RELEASE		



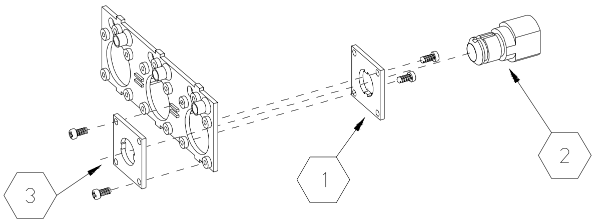
CUT RUBBER KEY PAD AS SHOWN
BEFORE ASSEMBLY.

DETAIL B



CUT THE PLATE BEFORE ASSEMBLY
LENGTH=49.0mm

DETAIL A



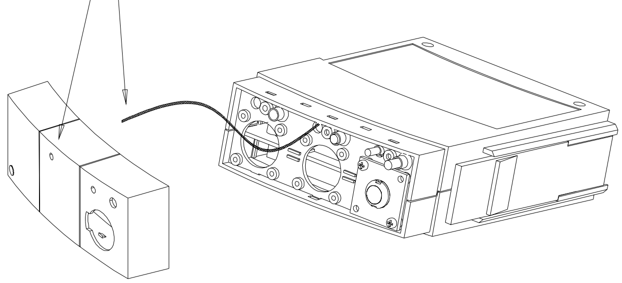
ASSY. OF AIR-CONNECTOR:

1. ASSEMBLE BRACKET (ITEM 20) TO THE PARTITION (ITEM 11)
BY USING 2 SCREWS (ITEMS 15).
PAY CAREFULL ATTENTION TO THE BRACKET'S ORIENTATION.

2. INSERT THE AIR-CONNECTOR (PART OF ITEM 3) THRU THE BRACKET
AS SHOWN IN THE DRAWING.

3. ASSEMBLE THE OTHER BRACKET (ITEM 20) FROM THE OTHER SIDE
OF THE PARTITION, TURN IT 90° AND FASTEN IT BY USING 2 SCREWS.

CUT THE EDGE OF THE PIPE, PUT GLUE (RTV)
AND INSERT TO THE MIDDLE LIGHT-PIPE POSITION.



4 HAYARDEN st. YAVNE.
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mennen medical

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DESIGN	YOAV FURST	22.12.04
DRAWIN	YOAV FURST	22.12.04
CHECK	ELI AVARGIL	22.12.04
PROJ. ENG.	ELI AVARGIL	22.12.04
Q.C		

RELEASE FOR PRODUCTION
DATE BY

MATERIAL: /

FINISH: /

DESCRIPTION:
Module EtCO2 (Oridion)
TOP ASSEMBLY

PART No: 551-142-000

BREAK ALL SHARP EDGES R0.1 Min. OR CHAMFER

TOLERANCES,mm UNLESS OTHERWISE SPECIFIED
LENGTHS:
HOLES:
HOLES LOCATION:
ANGLES:

SCALE: 1:2
SHEET 2 OF 2
SIZE A3
SURFACE ROUGH. √
DIMENSIONS: mm
REV. -